ICUP2020

International Conference on Urban Planning

ICUP2020

PROCEEDINGS

Serbia, Niš, November 13, 2020

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International Conference on Urban Planning

ISSN 2738-0548

3rd International Conference on Urban Planning - **ICUP2020**

Publisher
Faculty of Civil Engineering and Architecture, University of Nis

For Publisher
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Text formatting, prepress and cover
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ISBN 978-86-88601-52-8

Circulation
100 copies

Printing
Grafika Galeb Nis

3rd International Conference on Urban Planning - **ICUP2020**

Organized by
Faculty of Civil Engineering and Architecture, University of Nis
Urban Planning Cluster, Nis



Sub-organizers
Serbian Chamber of Engineers

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FOREWORD

It is a great honour and privilege to present to you the Proceedings of the Third International Conference on Urban Planning - ICUP2020, which is taking place online in these uncertain times of coronavirus pandemic. This year's event is scheduled for November 12-13th, 2020 in Niš. The conference is organized for the third time by the Faculty of Civil Engineering and Architecture - University of Niš and Urban Planning Cluster, thus continuing the tradition of being a biennial manifestation of the University of Niš. We believe that the main conference goal is accomplished, since we have once again brought together scholars, researchers, students and professional from all over the world and from the fields of Urban Planning, Urban Design, Architecture, Civil Engineering and related fields.

Having successfully discussed a broad spectrum of planning, design and development issues during the First and the Second ICUP conference, it is now time to focus on the resilience of cities, while trying to shape urban landscape by promoting nature, cultural heritage, technologies and social equity. Topics that ICUP2020 is focusing on this year include, but are not limited to: Nature-based solutions in urban areas, Mitigation strategies for climate change, Cultural heritage in building urban identity, New approaches and concepts in preserving built heritage, New technologies and materials in construction, Social aspects in urban planning and design, Planning, design and development challenges in creating resilient communities, and Links between regulations, urban planning and architectural design.

After the review process, 30 conference papers from various study areas and diverse places in the world are discussed at the ICUP2020 conference. Contributing papers deal with highly topical reselience issues and therfore provide a valuable insight into contemporary urban theory and practice. The presentation of our eminent key-note speaker contributes to an interesting and successful conference, while the scientific contribution from the members of our international Scientific Program Committee guarantees a high quality Book of Proceedings that will inspire future research. I would therefore like to thank all of them, as well as teachers and associates engaged in the technical preparation of these Proceedings.

Given the importance of the topics elaborated at the conference and numerous questions that are raised here, ICUP conference will continue to explore topical issues in urban development for the benefit of our cities. I am pleased to invite all authors from the academic and research community to participate in future ICUP conferences.

See you all at ICUP2022!

***Petar Mitkovic**, PhD, Full professor*
Faculty of Civil Engineering and Architecture, University of Nis
Chairman of the Scientific Program Committee

CONTENTS

Disclaimer

The contents of the papers presented in this publication are subject to review, but the authors are responsible for the originality and quality of their papers.

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THE RESEARCH HISTORY OF SHRINKING CITIES: A CONCEPT OR NOT?

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ABSTRACT

Shrinking cities have become a well-known phenomenon in the current urbanisation. The topic of urban shrinking and shrinking cities as their spatial manifestation have been exploited in several international and regional projects and through numerous independent research works. Yet, the existence of specific concept concerning shrinking cities is still questionable in some circles. However, this is not unusual for topics of international consideration; many globally developed and applied urban concepts carry the same doubts, arisen from their general approach to encompass case studies at all meridians. The aim of this paper is to discuss if the concept of shrinking cities exits as an independent system in contemporary urban theory, as well as in related media coverage and practice. This is examined through the explanation of the development history of the research on shrinking cities, including the most important thoughts relating it as a theoretical concept. The paper passes through several development phases of the concept: from its negation, through formalisation, to general acceptance and exploitation by mass-media. The complexity of the development trajectory of the research of this topic confirms that the concept of shrinking cities matters, which is explained in the paper conclusion.

Keywords: *shrinking cities, conceptualisation, internationalisation, urban studies, theoretical development*

1. INTRODUCTION

The phenomenon of shrinking cities has been well-known throughout the history of urbanisation; population decline in cities due to different causes has been common since the appearance of the first cities (Bernt et al, 2012). Nevertheless, only in the last decades the frequency of urban shrinkage in the different parts of the world, as well as severity of this process in some cases have attracted the attention of scientific and expert circles (Wiechmann & Martinez-Fernandez, 2013; Richardson & Nam, 2014).

Global interest relating the research on shrinking cities has been evident in last two decades. However, there were initial doubts if the term of shrinking cities can be settled. Some experts concluded that it was impossible to define properly urban shrinkage due to its frequency and global prevalence (Avila de Sousa et al, 2011). This caused significant discussions how to define the phenomenon of urban shrinkage or a shrinking city it spatial representation among scholars in the initial years of the research (Pallagst, 2008; Fol & Cunningham-Sabot, 2010; Neill & Schlappa, 2016). The starting point in such discussions was urban demographics as a constant; population loss in a certain urban area is always seen as a key criterion to determine an urban shrinkage (Rieniets, 2006). Nevertheless, many questions arose in the first years of research. For example, if just demographic parameters are enough for this definition, how to characterise an urban area or how many years should be studied as critical to identify urban shrinkage or growth (Stryjakiewicz, 2013). Many scientists have realised that the process of urban shrinkage is complex and multi-layer; "A 'shrinking city' can be defined as an urban area that has experienced population loss, economic downturn and social problems as symptoms of a structural crisis" (Cunningham-Sabot et al, 2013, p. 14). Finally, Shrinking Cities International Research Network (SCIRN), which is the international board of experts in urban studies, gave the definition of shrinking city. "A shrinking city is a densely populated urban area that has on the one hand faced a population loss in

large parts of it (for at least 5 years, more than 0.15% annually), and is on the other hand undergoing economic transformation with some symptoms of a structural crisis" (Wiechmann, 2006, p. 7). This means that several aspects matter in this process: demographic, economic, temporal, physical, and functional ones.

The biggest challenge for the concept of shrinking cities, as well as for any international concept, is to cover global perspective of a focused phenomenon. There are even thoughts that the term *shrinking city* is intentionally internationalised to enable the creation of such internationally credited concept (Fol & Cunningham-Sabot, 2010). Nevertheless, this process has been followed with a lot of scepticism. Some scholars think that this concept does not present anything new. The already established the concepts of smart shrinkage and urban regeneration cover the essence of the process of urban shrinkage (Brandes Gratz, 2010). Olsen (2013) implies that the concept of shrinking cities is actually an amalgam of the other theoretical concepts. The others are fewer sceptics by having a stance that the formation of the concept is very complicated and still in progress (Guimarães et al, 2015). Hence, the existence of specific concept concerning shrinking cities is still questionable in some scientific circles.

The aim of this paper is to discuss if the concept of shrinking cities exits as an independent system in contemporary urban theory, as well as in related media coverage and practice. This is examined through the explanation of the chronology of the development of the research on shrinking cities, including the most important thoughts relating it as a theoretical concept. The complexity of the development trajectory of the research of this topic confirms that the concept of shrinking cities matters, which is explained in the paper conclusion.

2. METHOD

This paper is tailored as a theoretical review on the most significant literature and internet sources. Accordingly, the core of the paper is the presentation of three phases in the development of the concept by their chronological order. The paper therefore passes through all of them: from its negation, through formalisation, to general public acceptance seen through the exploitation of the concept by mass-media. Their explanation is the main contribution of this paper, too, because such theoretical approach has not been done till today. Thus, this is regarded as a confirmation of the concept existence.

3. THE DEVELOPMENT OF THE CONCEPT OF SHRINKING CITIES

Even though the concept of shrinking cities is not longstanding like some other ones (garden city concept, for instance), several developmental phases can be noticed from its establishment in the early 2000s:

[1] The negation of the concept during the 2000s during its establishment;
[2] The consolidation of the concept in the late 2000s and early 2010s; and
[3] The general public acceptance of the concept and its promotion in mass-media in the 2010s.

As it was already mentioned, even before the establishment of the concept some scientists in the west were aware about the rising number of shrinking cities in the second half of the 20th century as a topic in urban studies. This was mainly the case with the cities in the most urbanised societies, such as the USA, United Kingdom or Western Germany (Bradbury, Downs & Small, 1982; Friedrichs 1993). They used the term of urban decline to address this phenomenon (Haase et al, 2014).

3.1. Phase 1: Negation of the concept

From its early beginnings, the concept of shrinking has had a noticeable opposition among scientists, experts, politic elite and general public. This was especially noticeable during the 2000s, which can be named as the establishment phase of the both the term of urban shrinkage and the concept of shrinking cities. However, the visibility of fast urban shrinkage in the post-socialist cities of (East) Germany in the 1990s generated the interests (Fig. 1). The main contribution during these, initial years is given through the international project "Shrinking cities / Schrumpfende Stadte" (2002-2008), led by German cultural researcher Philip Oswalt. This project, based on cultural promotion of shrinking cities, had a strong visual component, which ultimately enabled the promotion and internationalisation of the term of shrinking cities.

Figure 1: Eisenhüttenstadt in (East) Germany – a new park on the place of removed empty residential buildings in a fast-shrinking city (Author: B. Antonić)

In the other side, this promotion had a strong opposition from its early beginnings. The term was marked as 'problematic' (Oswalt, 2005, p. 12). This was especially observable in public, where urban shrinkage had been seen as taboo topic (Kühn & Liebmann, 2012; Schlappa & Neill, 2013; Pallagst et al, 2014). The other, similarly negative connotations were also present, such as a treat, stigma, pathological phenomenon, abandonment, ruin or urban crisis (Avila de Sousa, 2010; Haase et al, 2014). The urbanisation patterns of 19th and 20th centuries with the fast growing of cities during industrialisation simply shaped the common opinion that urban development is the same as urban growth and *vice versa* (Oswalt, 2005; Avila de Sousa, 2010). Nevertheless, the promotion of the term of shrinking cities by the project made an early impact on its popularisation in the cities and countries which were researched by the project (Oswalt & Rieniets, 2006).

The reason why the promotion of the term of urban shrinkage during the (late) 2000s was successful is that urban shrinkage cannot be regarded as a negative process *per se*. Even more, scientists have found some positive consequences of urban shrinkage (Großmann et al, 2008). This is especially noticeable in the cities with high population densities, where these densities influence negatively on local economy and urban life (Lewis, 2014). Hence, urban growth can also bring some negative consequences for affected cities (Oswalt, 2005). In shrinking overpopulated cities, urban shrinkage can lead to new underused and free spaces and land; more free land usually means that this important urban resource is less expensive and therefore more available (Zakirova, 2010). Urban shrinkage can also enable the better quality of urban life in the previously overpopulated cities with the new space dedicated for greenery and open public activities (Fig. 1) (Djukić et al, 2018).

The promotion of both the term and concept of shrinking cities in the 2000s was carried mainly through intensive studies on the widespread and extreme cases of shrinking cities at different levels (global, regional, national). Many researches were also concentrated to present the overview of these cities through different and illustrative data arrangements: texts, tables, graphics, maps, etc. Such efforts resulted in the wide range of different compilations regarding this topic. The best example is probably the "Atlas of Shrinking Cities" (Fig. 2), published by the "Shrinking cities" Project in 2006. The main aim of the atlas was exactly to give a global overview on the phenomenon of shrinking cities (Oswalt, 2006).

Figure 2: The extract from the "Atlas of Shrinking Cities", which presents the different data arrangements (Source: Oswalt, 2006)

This atlas clearly showed the significance of urban shrinkage for global urbanisation. To conclude by the notion of Philip Oswalt from 2005 that the existence of many shrinking cities throughout the world implies that they cannot be considered an exception in the current urbanisation, but rather a new normality, even more visible in the future.

3.2. Phase 2: Consolidation of the concept

The research of urban shrinkage was in a transition from the late 2000s to 2010s. This period was marked by the first comprehensive guidelines and approaches how to overcome the problems caused by this urban process. Researcher teams from two international projects gave the main contribution: "Cities Regrowing Smaller – CIRES" COST Action (2009-2013) and "Shrink Smart – The Governance of Shrinkage" FP7 Project (2009-2012). Although both projects were mostly focused on European shrinking cities, they contributed greatly at global level. Moreover, many researchers from both projects continued to study this topic after it.

These researchers also worked on the conceptualisation of the topic of urban shrinkage. The main intention was given how to link local/national/regional approaches and works in these efforts (Großmann et al, 2013). Pallagst (2008) names them as 'regional schools', while Haase et al (2014) calls this situation as the 'pluralistic world of [urban] shrinkage' (p. 1521). The further identification of similarities and differences between these regional schools during the transition period contributed greatly to the formalisation of the concept as a coherent theoretical entity. This process was not important just relating the identification of the main features of the ongoing process of urban shrinkage, but also to settle and propose the joint approaches and models to adequately respond to urban shrinkage (Großmann et al, 2008; Haase et al, 2014; Martinez-Fernandez et al, 2016).

Three groups of thinking have been present relating this response to urban shrinkage. Many scholars underlined that the concept of shrinking cities should be properly connected to the theory of urban change (Fol & Cunningham-Sabot, 2010; Martinez-Fernandez et al, 2016). This theory says that each city passes through different phases in its development: urbanisation, suburbanisation, and deurbanisation as a final phase (Van den Berg et al, 1982). However, the second group of scholars pointed out many new examples of reurbanisation, especially among previously deurbanising Western cities (Haase et al, 2008; Couch et al, 2009). Furthermore, this process was also more related to bigger cities, under the strong influence of globalisation (Fol & Cunningham-Sabot, 2010). Finally, the last group of researchers have thought that the research of this subtopic is completely exaggerated, because reurbanisation does not mean that a city in redevelopment and revitalisation phase. In their opinion, new incentives and innovative procedures in local urban planning are crucial (Barke & Clarke, 2016).

This plurality of scientific thoughts certainly refers to the first signs of maturity of the already established concept. Nevertheless, the concept is still relative young, so it is expected that new elements will be added in the future, regardless they will be considered affirmative or challenging in the entire process (Hollander et al,

2009). Aside of this mainstream future task, a significant task is also to strengthen the concept of shrinking cities is to better connect it with the other close concepts and topics, such as an inequality in urban space or the efficient consumption of local/urban resources (Großmann et al, 2013).

3.3. Phase 3: General acceptance by public and mass-media

The third and current phase refers the period of the general acceptance of urban shrinkage as a new normality by public and the active promotion of both the term and concept in mass-media. This phase approximately started in the early 2010s. The main determinant is the appearance of thematic articles in mass-media. Few examples can be highlighted in the following table:

Table 1: The mass-media articles dedicated for the topic of shrinking cities

Year	*The title of mass-media*	*The title of Article*	*Keywords*
2011	*The Economist*	*Other shrinking cities: smaller is more beautiful*	*Figures, extremes*
2012	*The Business Insider*	*The 28 Fastest-Shrinking Cities In The World*	*The most famous examples, the largest shrinking cities*
2012	*The Guardian*	*Shrinking cities: are smaller economies always a bad thing?*	*Figures*
2015	*The Economist*	*How to shrink a city*	*Global forecast, mapping*
2016	*The Guardian*	*Shrinking cities: the rise and fall of global urban populations – mapped*	*Figures, mapping*
2017	*Financial Times*	*Shrinking cities: population decline in the world's rust-belt areas*	*Figures, comparison, mapping*

It is evident that the main preoccupation in these articles is the figures about shrinking cities and their geographical distribution (maps), which is the same approach as ten year before, but only in scientific circles. This can be interpreted as the same approach to convince (now) general public that shrinking cities are something normal.

Apart of this tendency, the concept of shrinking cities has become more interesting for the wider scientific audience last years. Therefore, there are first explorations of some side-topics within the concept, such as cultural heritage in shrinking cities, underused communal infrastructure or participation in urban shrinkage. The other directions are oriented towards new countries and world regions to explore their shrinking cities, such China or Latin America. These new research directions are expected with the maturity of the concept. However, they also point that the concept is still developing.

4. CONCLUSION

The paper presented the development history of the research of shrinking cities, arranged into three phases. Several explained elements clearly underpin that this research has been carried to unequivocally conceptualise a novel scientific theoretical corpus in urban studies:

First, key terms *urban shrinkage* and *shrinking cities* have been deeply scrutinised among scholars during two last decades of the scientific promotion of both phenomena. They were first negated, then accepted among scientists and finally among general public. This process of a step-by-step acknowledgement of key terms is typical for all important theoretical concepts.

Second, the temporal element of the concept development is also presented. The concept has passed through three distinctive phases. This process started with the research of the current state of the phenomenon, i.e. the identification of shrinking cities and their mapping. Then, the focus was reoriented towards the understanding of the causes of urban shrinkage and it finally moved to the finding of approaches and measures how to cope with urban shrinkage through the planning of urban development.

Third, the spatial development of the concept of shrinking cities is visible, too. The countries and regions researched in the first phase were those ones with widespread urban shrinkage. However, in the next two phases the spatial coverage of the research has been significantly expanded, encompassing the entire world today. This underlines the global perspective of the concept.

Taking in account all these conclusions, it is obvious that all afore mentioned scientific efforts results have results into a unique concept of shrinking cities. However, the ongoing widening of the research on shrinking cities with new subtopics and regional studies also implies that there are still the unexplored 'niches' of this

phenomenon and that the formation of the concept is not finished. Thus, the further development of the concept of shrinking cities will certainly continue in the future.

ACKNOWLEDGEMENTS

This paper is done as research for two international projects financed through the EU programmes: (1) Cultural Heritage of the Danube as a Tool to Develop Local Opportunities and Common Brand of Underprivileged Communities – DANUrB+ (2020-2022), project in INTERREG EU Danube Transnational Programme; and (2) CREATIVE DANUBE: Innovative Teaching for Inclusive Development in Small and Medium-Sized Danubian Cities (2019-2022), project in Erasmus+ KA203 Cooperation Programme.

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URBAN REGENERATION & ARCHITECTURAL RECONVERSION. TWO PROJECTS

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ABSTRACT

After the Seventies urban planning and architectural design represent two disjointed fields, several times in conflict or contradiction, not referring to unitary actions containing the large-scale programming with the architectural vision. Urban regeneration represents the rediscovered point of connection through an approach that by giving new meanings to disused pre-existences in central or strategic areas generates new value through new functions and favorable conditions in a strategic key. We dealt with two major projects in Italy starting from these assumptions applied on two radically different complexes with the same regenerative and qualitative aim.

The first regards the restoration of Chiostri di S. Pietro monumental complex with the aim of creating a cultural venue of international relevance strengthening the natural vocation of the ancient disused Benedictine monastery. The project involved three closely related interventions: the restoration of the Renaissance body, the addition of the new Urban Open Laboratories, the redevelopment of the as public spaces returned to the city.

The second concerns the reconversion of the largest disused buildings of Officine Reggiane, one of biggest XX century Italian industrial precint. The Shed 15 is grafted on the orthogonal grid of the area and related to the completion of Innovation Park. Into 12.000 sm with spaces intended for innovation and research, the project increases public spaces as a continuum integrating the macro-system of the city-park with the microsystem of the offices-laboratories. The main elements of the project are articulated in a strong functional, visual, connective and landscape continuity.

Keywords: *urban regeneration; architectural heritage; industrial heritage; functional reconversion; architectural innovation*

1. DESCRIPTION OF THE PROBLEM INVESTIGATED AND APPLICATION FIELD

After the seventies urban planning and architectural design represented two disjointed areas, several times in conflict or contradiction, difficult to refer to unitary actions containing the large-scale programming with the architectural vision capable of transforming complex operations into virtuous results. Urban regeneration represents the rediscovered point of encounter between urban planning and architectural design through an approach that by giving new meanings to disused pre-existences in central or strategic areas generates new value through new functions and favorable conditions in a strategic key respect to the urban context. Our office ZAA Zamboni Associati Architettura dealt with two major projects in Reggio Emilia (Italy) starting from these assumptions applied on two complexes of a radically different nature with the same regenerative and qualitative aim.

2. RESEARCH STAGES, METHODS AND RESULTS

The first project concerns the reconversion and restoration of Chiostri di S. Pietro, the most extraordinary monumental complex in the city of Reggio Emilia (Fig.1), with the aim of creating a cultural and innovation venue of international relevance strengthening the natural vocation of the ancient disused Benedictine monastery. A now obsolete reading of our cities contrasts historical centres, places of conservation, to the outskirts, places of a more arbitrary building replacement in the best cases. It is rare to lead a project that at the same time encompasses in a city centre the complexity of conservative intervention together with the

challenge of building replacement and that of rediscovering a public space. The challenge was grafted onto the particular nature of the object of regeneration, an ancient monastery unused for centuries as such and once a protected and circumscribed place within its cloisters, by its very nature introverted spaces destined for the internal use of a few, with the aim on the contrary to re-open it and return it to the city and to public use without distorting its salient aspects. The challenge was grafted on the particular nature of the object of restoration, an ancient monastery unused for centuries as such, a place destined for the use of a few and circumscribed towards the surrounding space within its closed cloisters, once vegetable gardens and open countryside, with the aim of opening it to the city and public use.

Figure 1: Aerial view of Chiostri di San Pietro after the intervention (Zamboni Associati)

The monumental body is structured around two cloisters, the oldest of which dating back to the founding years in the second decade of the 16th century and testifies to a moment of incredible liveliness of the monastic and Benedictine architecture. The complex has undergone many vicissitudes that over the centuries have transformed it, starting from the Napoleonic era, into a civil court, military barracks, educated for girls, while the areas of relevance retained the only original size with most of the walls that surrounded the monastery and the old stables. As a military area then decommissioned in the late twentieth century, this place represented an inaccessible area in the heart of the historic city until the moment of rediscovery for sporadic events such as the European Photography festival. With the aim of strengthening its natural and strategic cultural vocation, the restoration of the complex was financed with European funds through the regional program POR-FESR Axis 6 "Attractive and participatory cities" to return it to the public as a cultural centre of international relevance.

The project involved three closely related interventions in a single operation. The first concerned the completion of the conservative restoration of the monumental body with the adaptation of the functional equipment for a fruition of excellence. The second involved the demolition of the minor bodies behind them, incongruous volumes dating back to the most recent military occupation, and the reconstruction on the same footprint of the new building of the Urban Open Laboratories, in close relationship with the monumental complex and in functional continuity with the adjacent building of the old stable, also restored as an integral part of the Laboratories. The third intervention involved the redevelopment of the courtyard spaces and the areas behind them that persist between the buildings, formerly connected to the monastery, discovering its function as a public crossing and as a relationship space open to the city.

The regeneration of the monumental body was carried out through the completion of the conservative restoration of the basement floor, mezzanine floor and cloisters, with the only exception of the first floor. Given the nature and complexity of this extraordinary building, between project and construction site we acted with the utmost rigor, trying to respond with operational and methodological coherence, where operational questions helped to refine methodological choices and viceversa, as happens in restoration projects of big complexity. The Chiostri di San Pietro complex follows the casuistry of other large historical big complexes,

showing signs of stratified transformations or unfinished parts to be carefully interpreted. The traces of the changes that the complex has undergone over time have been maintained, preserving the signs of the alterations and changes of destination, while enhancing the unfinished character, a condition that has become the guiding thread of our intervention not only for the monumental part. It is with this spirit of rediscovery and enhancement that the project and the restoration site of the entire complex were addressed.

The most relevant aspect that required the greatest philological rigor was the intervention on the Chiostro Grande. The question that still leaves ample interpretative space, regarding the reasons for the abnormal condition of the Chiostro Grande, is that of the current lowered portion of the courtyard and the emergence of the base wall part, which is the subject of a debate, in the absence of reliable documents, on what was the level and nature of the floor in the original project. It would seem logical that the share should be slightly lowered compared to the walkway of the loggia, an evident aspect by observing the openings in correspondence with the central serliane that jut out into the void or the rough-hewn rustication visible in the base part below, where moreover the structure of the arches emerges unloading of the vaults with different geometries, a sign of an interrupted construction site then taken up again with the Giulio Romano project. But the Chiostro Grande today returns in a completely natural way the extraordinary historicized unfinished condition that reconfigures the courtyard as an arena or cavea ideally lowered compared to the loggiato of the Chiostro Grande and placed at the same level as the surrounding courtyard areas.

The nowadays aspect is that of a typological anomaly unique in its kind, which generates an extraordinary glance at those who access the Chiostro Grande from the lower level, allowing the independent use of the courtyard with respect to the level of the loggiato. This condition allows not only direct use from outdoor spaces, but also a privileged use for events, a situation that the project has enhanced and emphasized also in relation to the choice of flooring. The lowered and thus paved Chiostro Grande becomes even more clearly an interior or a large room without ceiling, emphasizing an intention implicit in the formal nature of the cloister as an outdoor room. The image of the unfinished transforms and transmigrates finding its own formal completeness as in Michelangelo latest works. For methodological coherence it was then decided to reveal the unfinished also in the wall finish of the base part outcropping in the Chiostro Grande leaving in filigree with a veil all traces of the stratified transformations.

Chiostri di San Pietro complex testify to an unfinished condition also in the planimetric sense, since evidently the complex was destined for expansion towards the east, as shown not only by the drawings attributed to Giulio Della Torre, but also today's state of the large wall that delimits the monumental body towards the courtyard areas to the east, a front without decorations or elements of relief if not buffered holes ready to be reopened at the time of expansion to serve future cells. On the other hands it would not be justified the extraordinary size of the Chiostro Grande compared to the small number of rooms in the north and west wings.

The unfinished has become the point of view, the method and the conceptual filter for each choice that has regarded the entire complex, including new additions and open spaces. It is a principle that expands the meaning of the context, interprets what is not visible, amplifies it and places a non-formal, non-definitive limit on it, assuming a higher order completeness as a possible point of arrival. Following this approach was a way to leave the project open, refining the method during the intervention. This unfinished condition also in relation to the courtyard areas has allowed conceptually to consider the space behind it as independent from the monumental body, with which it also maintains a direct relationship to the lowered portion of the Chiostro Grande. This relationship is underlined by the only opening which, from the elevation of the mezzanine floor, has been maintained with the direct view towards the courtyard areas and the old stables, allowing to perceive the surrounding walls in full and from an elevated position that once delimited the productive areas of the monastery.

The Open Urban Laboratories (Fig.2) represent the management "machine" of the complex, an aspect emphasized by the architectural form and by the emergence in the sloping roof of the technical volumes also serving the monumental body, avoiding machineries incompatible with the extraordinary architecture of the monastery. Built on the footprint of military buildings already destined for demolition, the new building defines the completion and closure of the monumental complex to the north, ideally representing the limit and edge towards the twentieth-century city which is located behind. Conceived as a sequence of three large serial spaces, it is characterized by maximum internal flexibility also in relation to the external spaces and the courtyards which favour natural through ventilation. The south facade allows the maximum contribution of natural lighting controlled through a polycarbonate system and wooden bars, from which the heads of the concrete partitions emerge to denounce the scansion of the internal spaces. All the wall structures are in white

washed concrete and left exposed. The horizontal glazed opening that runs for all the length of the laboratories allows uninterrupted views of the perimeter wall of the ancient monastery and excludes the view of the upper part, as if to underline a protected area enclosed in the heart of the city. The serial aspect, the bare structure, the rhythm of the facade in the repetition of its constituent elements and in the interruption of the wooden bars when the head of the beams emerges, all this contributes to recalling a remote dialogue with the monumental order of the building ancient and its unfinished base part.

The restoration of the old stable located towards the east of the courtyard areas was carried out with the same criteria adopted for the monumental part, although of minor value and without any decorative element. Formerly used as horse stables for the monastery before and then for the military area, the building has undergone multiple transformations over the centuries, which have only partially preserved its original status. The vaulted space on the ground floor remains and the unitary space of the upper floor has been rediscovered, with the restorations of the wooden roof. In the facades we rediscovered the original window holes and the ancient wall texture treated with a lime veil that allows to read the wall face with its "scars". The aim was also to seek a balanced relationship between old and new through a material dialogue with the adjacent Laboratory building. At the head of the two buildings, where they converge, the ancient courtyard on the side of the stables has been rediscovered like the oldest part of the wall that originally surrounded the areas behind the monastery, today the visual fulcrum of the portals that define the internal spaces of the Laboratories.

The intervention was completed with the redevelopment of the courtyard areas, before our intervention asphalted spaces resulting from the prolonged use for the military use. With the aim of rediscovering them as connecting spaces between the restored buildings and as public places, the definition of the new spaces was achieved through the rediscovery of the visual relationships and connections between old buildings, new building and open spaces, but also with the planting of large trees, with a new lighting system enhancing and defining the spaces and with a new calcestre permeable flooring that emphasizes the continuity of the pedestrian area. Like a natural soil from which buildings emerge, this finds its culmination in the Chiostro Grande which can be accessed in continuity with the courtyard areas. To emphasize the appearance of natural soil from which the base of the Chiostro Grande emerges and to reinforce its unfinished aspect, a gap has been left between the new flooring and the rough masonry that allows the outflow of rainwater, behind which and up to the wall small gravel has been crammed. The new natural flooring continues uninterruptedly, mending the internal and external spaces of the complex, as an element of continuity contributing to a material and perceptive unity in relationship with the old and new buildings. The same impression has been sought in the choice of materials for the whole intervention, studying the proportions between the parts, in the balanced relationship between the buildings, in the way in which they interact with each other and with the external spaces. Rediscovering the ancient walls protected with a veil of slaked lime the latter are enhanced as a backdrop that defines the edges of the entire restored complex.

Originally the entrance to the monastery was from the churchyard of the adjacent church of San Pietro through the Chiostro Piccolo. It is in more recent times that the entrance was consolidated on the opposite side, through the entrance courtyard from via Emilia, where once there were the vegetable gardens and the production areas of the monastic complex. Confirming the entrance on this side, the problem remained of defining a ramp to allow wider access to the ancient building. Due to these aspects, the new ramp that leads to the monumental body detaches from it as an autonomous element, contributing rather to the definition of the edge of the entrance courtyard with respect to the pedestrian path that detaches and continues north. The parapet in thick wooden bars, markedly oversized compared to the mere protection function, constructively recalls the façade of the Laboratories and horizontally turns on the external side as a seat. But by far the most important aspect of the whole intervention was reopening the accesses to the monumental complex from two opposite sides, allowing an urban crossing prevented for centuries and opening to the city the ancient rediscovered spaces. In search of a balanced relationship between ancient and contemporary, between rediscovering spaces and establishing new compatible uses, the intervention revives the Benedictine matrix able to combine conservation with innovation.

Figure 2: The monumental body and Urban Open Laboratories seen from old Stables - Ph. Alessandra Chemollo

The second project by ZAA Zamboni Associati Architettura concerns the reconversion of the largest disused building of Officine Reggiane, one of biggest XX century Italian industrial precinct. The intervention area is located in the city of Reggio Emilia, north of the historic railway station and within the historic S. Croce district. The project area is inserted within the perimeter belonging to the former "Officine Meccaniche Reggiane" and includes the old Shed 15 and the large adjacent area. This area, the historic headquarters of the Officine Reggiane has an extension of about 260,000 m2 and is partly currently abandoned. The Officine Reggiane with the Santa Croce district, constitute a milestone both in the history of Reggio Emilia and in the history of industry in the city. It is the first industrial area of the city, so today it represents a place of memory, for the many experiences that have gone through it and for the expectations, fears and hopes that the future of the area raises in the citizens of Reggio Emilia.

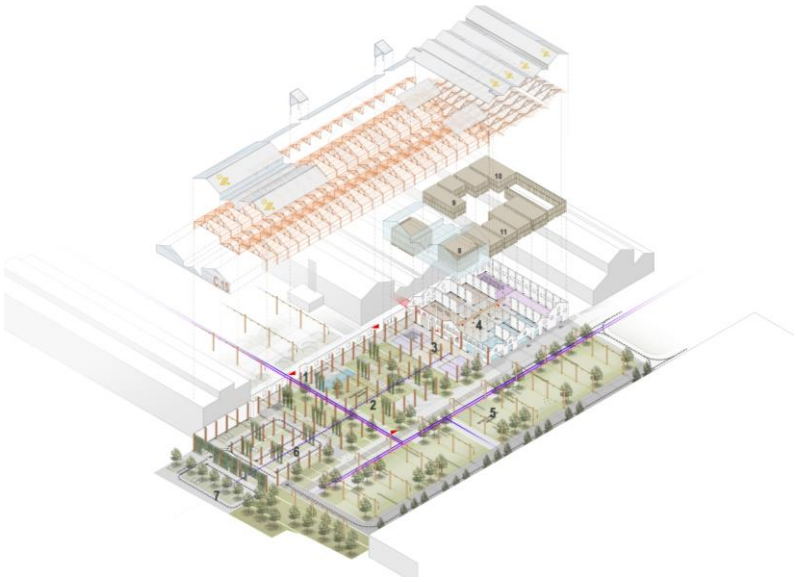

Figure 3: Axonometric scheme of the intervention on *Building 15* (Zamboni Associati)

The choice of the intervention within an abandoned industrial area, in addition to stimulating a new season of urban regeneration, acts as a purifying flywheel redeveloping not only the concepts of historical and social memory of the place and the neighborhood but also rebalancing the structure of a important part of the city, both in terms of infrastructures and in terms of buildings. The Officine Reggiane embody that cultural, historical and social process capable of accompanying with a sense of belonging and recognition any design action

towards processes of identity requalification, enhancement of figurative characters and reformation of urban cornerstones. Physical testimony of multiple experiences, a symbol of expectations, a place of fears and hopes, the Reggiane are a city within a city: in functional complexity, in morphological relativity, in the quality of open spaces, in the opportunity of covered spaces.

The project strengthens the principle according to which reconverting industrial architecture means establishing a relationship with the knowledge of meanings, interpreting the ruin as a construction site, as a building that in its deterioration reveals its compositional and constructive rules. Following this principle, the goal is the regeneration of a micro-landscape, strengthening the architectural rendering of the whole and ensuring that everything recovered retains this mysterious quality. The deterioration of the Shed 15 today theatrical due to the absence of the dynamic component of the place, is easily replaceable with new dynamic and regenerative components intrinsic in its character and its great potential as a public space.

The Shed 15 due to its preponderant size compared to the volumes and equipment provided and for its strongly connoted conformation defined to the north by volumes of lesser height and serial and to the south by a much more substantial part in terms of volume organized in three naves of great height, it lends itself to a project that integrates closed, covered and open spaces in a logic of interpenetration and functional, visual and distance integration. The proposal (Fig.3) emphasizes the concept of an entirely permeable space, in which outdoor spaces and green areas can relate the different environments in a unitary design that enhances their vocation and role as a hub with the adjacent pavilions, as a large lung green for the Innovation Park. The project envisages a large endowment of green spaces with a strong public value inherent in the configuration that the spaces already possess, seem to suggest or can favor. A design is set up that integrates existing / new, public/green spaces, functional/leisure spaces, through a strong internal-external interaction and a gradual transition between shaped spaces, covered paved parts, uncovered paths and green areas. In this model, green and public spaces represent not only the connective but also constitutive elements around which the remaining system of equipment and volumes destined for the activities envisaged here is generated, as a continuum of green space, which integrates the macrosystem of the city-park with the microsystem of the offices-laboratories (Fig.4) with a predisposition also for free time.

Figure 4, 5: Views of the reconverted industrial building into a new public park with innovation centre (Zamboni Associati)

By extending the regeneration effect already envisaged Shed 15 integrates and completes the Innovation Park quadrant by intercepting and connecting the system of distances and functional equipment in a more extensive way. The project of the Shed 15 is grafted onto the orthogonal grid of the Reggiane area, providing for the enhancement of several areas, significantly increasing the extension of the public space inside the shed, as a continuum of the green space, integrating in substance the macrosystem of the city - park with the microsystem of offices - laboratories towards a spatial predisposition also for free time.

The project involves the recovery and consolidation of the perimeter walls of the facade that are intended to be maintained, while the part that is considered less significant for the philosophy of the project is demolished to leave bare the roof with the supporting structure consisting of metal columns, beams and joists always in metal. Among the redeveloped blocks, large green gardens will be created which will be an element of communication between Technopole car park to the west, and the large park area to the east, and will connect with the public green area located between the two connecting axes alongside. The routes will comply with the regulatory requirements regarding the removal of architectural barriers. The construction of a new access road to the sector from Viale Ramazzini and the construction of a large green area are also planned for the external

areas. To the east of the warehouse, a large green area will be created which will constitute a new green lung for the entire redeveloped sector. This large green area will integrate the green system in the project also in the other interventions to constitute a real system. The green area (Fig.5) will be planted with tree species and can be equipped for different uses both as a simple resting place and aggregation until it becomes a sort of extension of the internal spaces of the shed and therefore a sort of green backdrop where to set up various activities connected with the functions present inside the building. The constituent elements of the project are articulated in a strong functional, visual, connective and landscape continuity. The parts that make up the project are listed below, starting with the two main pedestrian entrances located on the west side.

3. CONCLUSIONS

Although strongly different, the two interventions reflect the same attitude aimed at transforming the historical or industrial heritage through new compatible uses and capable of triggering virtuous processes capable of regenerating not only the buildings or complexes subject to intervention but also entire areas of a city.

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TALL BUILDINGS ARTISTICALLY CONSIDERED? HIGH-RISES AND THE HISTORIC URBAN LANDSCAPE

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ABSTRACT

Tall buildings are a controversial topic in urban planning, particularly when the construction site is located in an urban conservation area or close to it. Heritage conservation measures in many countries often regulate the height of new buildings to preserve a traditional, iconic urban panorama. For some, the new building´s height in and of itself is a violation of heritage values; others see high-rises as trademarks of progress. Both attitudes are quite recent. In the past, bell-towers, spires, minarets, and domes enriched urban skylines without compromising their visual coherence and what was perceived as beauty. The paper explores various aspects of the current debate, tracing its history back to the turn of the twentieth century when the office and residential skyscraper enlarged the family of tall buildings. Unlike in America, these two types of buildings remained rare in Europe until the 1950s, and the exceptions often involved a symbolical underpinning. Later on, high-rises became part of the mass building industry in Europe, changing the urban environment significantly. After 2000, despite the high cost and public disapproval, high-rises are still constructed and designed often with the ambition to compete with traditional landmarks. The paper mentions several current projects (in Prague, Olomouc, Vienna, and Seville) where the controversy affected heritage protection on various scales (NGOs, local policies, and World Heritage advisory bodies). Is the height of new structures the most significant threat to preserved heritage values? Is their contrasting image inevitable? And what about high-rises that deserve heritage protection?

Keywords: *architecture; historic urban landscape; architectural conservation; skyscrapers; Europe*

1. INTRODUCTION

High-rises are a popular theme in discussions about architecture, attractive even for those who otherwise do not express their opinions on the appearance of buildings. This is quite understandable because high-rises have become dominant elements in the city panorama. Architects and investors do not hide their ambition to alter a city's visual identity through their work and thus significantly influence the lasting image of the city left in the inhabitant's or visitor's mind. Such ambition inevitably brings controversy of a primarily aesthetic character. Does the new building fit with the environment for which it was designed? Does it bring disharmony into the otherwise harmonious whole? Or does it offer a new dominant element in an environment that has thus far come across as too static or chaotic? The seemingly more objective criteria, such as the overall volume of the investment, the possible impact on transport services and the previous experience and performance of the investor, are only a secondary topic of discussion.

In recent decades, the word 'high-rise' has become synonymous with 'skyscraper,' perhaps because skyscrapers have been the default reference for tall buildings. Their names often contain the word 'tower.' However, dictionaries of architecture understand the skyscraper as a specific subset of the high-rise, namely one that is in large part inhabited or habitable, containing work spaces, most often offices. The word skyscraper is not used for tall structures that are meant for only a few inhabitants (lighthouses, fortification or clock towers, minarets and bell towers with an apartment for a tower attendant or announcer), for visitors only (lookout towers) or for no visitors at all (transmitters) (Figure 1, 2).

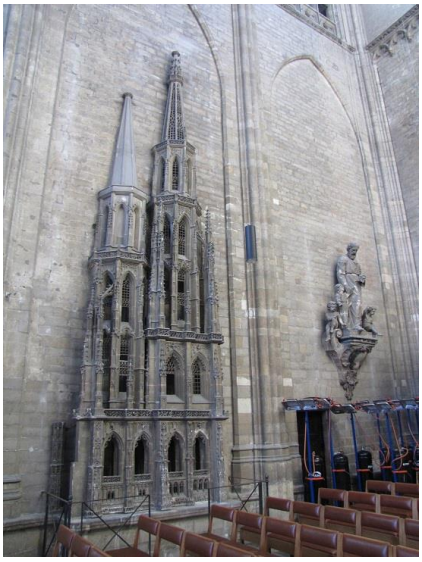
(1)

(2)

Figure 1**:** Senetářov – folk house, in the background is the Kojál TV transmitter, the third tallest building in Czechia (340 m). Photo 2020.
Figure 2**:** Istanbul, Süleymaniye Mosque. Photo 2019.

While the skyscraper was invented in America in the second half of the 19th century, towers and tall buildings in general form part of the architectural traditions in diverse cultural regions. Paradoxically, one of the oldest extant buildings in the world, the 146.5-meter-tall Great Pyramid of Giza, was the world's tallest structure from the third millennium BC until the 14th century! Between the 14th century and the year 1884, bell towers of various European Gothic churches held that record: the preserved medieval tower of the Strasbourg cathedral is 142 m tall, while the tower above the transept of the cathedral in Lincoln (destroyed by a storm in 1549) measured approximately 160 m. The Ulm Minster tower, completed as late as 1890, reached 161.5 m in height. Resembling today's corporate investors, medieval cathedral builders would sometimes compete to erect the tallest building: the Church of St. Peter in Leuven (Belgium) houses a stone model of the church's facade featuring three towers of which the middle one was planned to reach the height of around 170 m! This tower was never built due to lack of money and workforce; moreover, the stone Gothic structure itself, albeit lightened by way of ribs and openwork, reached its limits in terms of the material's weight and durability of joints at 150 m (Figure3, 4).

(3)



(4)

Figure 3**:** Strasbourg, cathedral. Photo 2010.
Figure 4**:** Leuven, Church of St. Peter, model of the planned three-tower facade, J. Matsys, 1524. Photo 2012.

Partly because the tallest structures had until the 19th century a predominantly religious function (to a degree, this also applied to pyramids as memorials of the deified pharaoh), people did not perceive them as obtrusive. The classicists may not have liked Gothic buildings, which were not to their taste, but they, too, strove to achieve dizzying heights—through cupolas and multi-storey onion domes. Gothic pinnacles, classicist cupolas, Islamic minarets and Chinese pagodas are not usually criticized for their height. On the contrary, they are protected as cultural monuments and tourists regard them as highly photogenic. What is it then that makes modern high-rises controversial? Why are they most often debated in European cities with long histories of

towers, whose inhabitants should presumably be used to this kind of architecture? These questions, along with a few selected examples, will be discussed in this study.

2. TALL BUILDINGS IN EUROPE – A BRIEF HISTORY

Private buildings traditionally grew wider rather than taller—until this was no longer possible due to the high density of lots in cities bound by their fortifications. Relatively tall residential buildings forming compact street fronts were preferred for another reason—in hot regions in the Mediterranean and on the Arabian Peninsula, these structures effectively shaded the streets. The unified height of these residential houses was, in places, disrupted by private towers, which served both defense and self-presentation purposes; San Gimignano in Italy is a famous example illustrating this urban structure. Secular public buildings (hospitals, schools, administration offices) were traditionally wider than taller as were residences of aristocrats and sovereigns, except for fortification elements. In practically all cultures, this resulted in variegated urban silhouettes with three basic levels: 1 – common residential and public buildings, 2 – fortification towers and residential towers of the wealthy and influential, 3 – temple towers and domes, and—in Europe—city halls. In medieval Europe, the tallest towers were seen as prestigious public buildings and their construction was financed from multiple sources—the sovereign, municipality, the church, and citizens' contributions.

By 1884, the new tallest building in the world was the Washington memorial (h. 169 m) in the US capital; it also has a quasi-religious character. Five years later, however, it was surpassed by the Eiffel Tower in Paris (1889, 300 m). In the following decades, American skyscrapers rapidly approached the 300-meter height; beginning in 1930 with the Chrysler Building in New York, skyscrapers and telecommunications towers and masts have competed for global, vertical primacy, while sacral buildings remain on the sidelines.

It is not necessary to reiterate the technological innovations that contributed to the rise of skyscrapers. More important for the present study is Louis Sullivan's 1896 essay on the optimal appearance of these buildings entitled *The Tall Office Building Artistically Considered*. Sullivan, a Chicago architect and pioneer of skyscraper design, was well aware of the fact that only two parts of the vast skyscraper mass would be truly visible to viewers—the ground floor from up close and the very top from a distance. For this reason, he recommended that architectural (stylistic) articulation concentrate in these two parts, while the middle part, resembling the shaft of the ancient column, remain less adorned and unified. In the same period, architect Daniel Burnham, another member of the so-called Chicago school of architecture, embraced the reality of the fierce American development in his aesthetical considerations. According to Burnham, the situation in which the forest of private high-rises overshadows low public buildings including churches is acceptable: urban planning still involves a visible hierarchy in the typology of buildings, it is only the relationship between a building's social importance and its height that has been reverted. While public buildings remain low and wide, private ones are now narrow and tall.

Europe welcomed American-style skyscrapers with reluctance. At the turn of the twentieth century, European professionals largely considered American architecture as unsightly and dependent on European examples. However, there were exceptions: in 1904, the British Edwardian architect Arthur Beresford Pite admired the skyscraper's stylistic freedom and the Prague art critic František Xaver Harlas praised the 'taste and originality' of American skyscrapers as early as in 1898. The first European skyscraper—the so-called White House in Rotterdam from 1898—is an office building with ten above-ground floors (Figure 5). It was built of bricks, resting on piles; further skyscraper designs were already based on ferro-concrete construction. Between 1908 and 1911, the 90-meter-tall Royal Liver Building was erected on Liverpool's embankment. Before World War I, designs for buildings reaching towards 100 m also appeared in cities such as Vienna (Leopold Bauer) and Prague (Josef Gočár). These skyscrapers, however, were never built. Although in this period state heritage protection as we know it was largely non-existent, there were strict regulations concerning new buildings' height and facade decoration. In the second half of the 19th century and the first four decades of the 20th century, a number of European cities replaced their existing buildings with new developments, a radical move that increased the average height of houses from four floors to six or seven, or—in Hamburg, London, Valencia and Madrid—even a few floors more. Although small turrets and decorative gables on these new buildings jutted out of the new silhouette, church and city hall towers were still the dominant feature, along with smoke stacks in industrial quarters. In his influential book *The American Vitruvius* (1922), the German-American architecture critic Werner Hegemann praises skyscrapers as 'America's most valuable contribution' to urban planning and recommends that they be included in existing urban tissues as dominant points in the fashion of medieval towers. This way, the centre of Stockholm was complemented with the King's Towers (1919–1925), likely the first skyscraper twins, and Antwerp received the famous Farmer's Tower (Boerentoren) (Figure 6).

(5)

(6)

Figure 5**:** Rotterdam, White House, W. Molenbroek, 1897–1898. Photo 2012.
Figure 6**:** Antwerp, Boerentoren, J. Van Hoenacker – J. Smolderen – E. Van Averbeke, 1929–1932. Photo 2012.

It was not until the 1930s that European skyscrapers began to cross the 100-meter mark (Torre Litoria, Turin, 1931–1933). Madrid was among the cities whose panorama was most affected by the first and second-generation high-rises. Nevertheless, the Spanish capital had no dominant historic towers before the modernization and so the new skyscrapers did not have to compete with older structures (Figure 7). In Spain and elsewhere in Europe, high-rises featured rich traditionalist morphology, in some places only slightly simplified in the art deco fashion, allowing them to fit with their surroundings. Fully avant-garde, box-shaped skyscrapers with a compact glass facade, as Mies van der Rohe and others imagined them, did not appear in Europe, and America for that matter, until after World War II. In the 1930s, two Czech buildings came closest to these visions—the General Pension Institute in Prague by Josef Havlíček and Karel Honzík (1929–1934) and the Bata administration building in Zlín by Vladimír Karfík (1935–1939) (Figure 8).

(7)

(8)

Figure 7**:** Madrid, Telefónica, I. Cárdenas Pastor – L. Weeks, 1925–1929. Photo 2009.
Figure 8**:** Zlín, Bata administration building No. 21, V. Karfík, 1935–1939. Photo 2012.

Ludwig Mies van der Rohe probably played a crucial role in how the aesthetics of the skyscraper changed after World War II and how we understand it today. When he left for the United States in the 1930s, Mies was given the chance to design (and realize) buildings with the appearance of cantilevered glass blocks; several years later, this fashion returned to the Old Continent surrounded by the aura of the modern style in the free world. While in Franco's Madrid and Stalin's Moscow of the 1940s and 1950s architects build towers consistent with the pre-war ornamental aesthetic, Stockholm, West Berlin, post-Mussolini Milan and Brussels as the capital of (West)European unification saw the rise of slender glass blocks whose shape and coating resembled nothing in their vicinity. Communist countries soon adopted this symbolism: as part of his effort to erase Stalin's legacy from people's memory, Khrushchev ordered architects to move away from stylistic traditionalism and instead adopt reduced architectural morphology which suddenly the whole world, regardless of political regime, considered the epitome of modernity. In both the East and the West, the Mies-style form—the tall, box-shaped structure inspired by geometrical abstraction—became the new norm in mass housing development and the construction of common administration buildings. These kinds of buildings formed the majority of architectural commissions. Hand in hand with this development went the transformation of architectural education and the change in education and practice in the construction industry.

Prefabricated ferro-concrete housing projects present a modernist vernacular of sorts: here, the luxury aesthetic of skyscrapers is transformed into a product and expression of everyday banality. Still, this did not mean that European cities would begin to look like American ones: while in Europe housing estates now encircled the more or less preserved city cores, newly subject to heritage protection, in America the spiky downtowns soared over endless suburbs with low residential development. Thanks to engineering innovations, American skyscrapers began to approach 500 m in the 1970s, while in Europe the 240-meter-tall Stalinist building of Moscow State University held the record for almost forty years (1953–1990) (Figure 9). Broadcasting towers often dominated city panoramas (East Berlin, Moscow-Ostankino, Prague-Žižkov) but skyscrapers did not get much taller, drawing attention through their contrasting shape rather than through height. Although there were many high-rises scattered around European cities, up until the beginning of the 1990s there were only five cities featuring larger high-rise quarters modelled on American downtowns—Paris (La Défense), London (City and Docklands), Frankfurt am Main, Benidorm and Madrid (AZCA quarter) (Figure 10). Unlike American cities, some of these urban wholes (La Défense, Docklands, AZCA) involved a complex urban design with pedestrian zones, parks and abstract artworks underlining their innovative—'modern'—narrative.

(9)

(10)

Figure 9**:** Moscow, Lomonosow Moscow State University, L. Rudnev, 1949–1953. Photo 2004.
Figure 10**:** Frankfurt am Main, Willy-Brandt Platz. Photo 2009.

The 1990s brought the beginning of the true high-rise boom in both Europe and other continents. American-style quarters have begun to grow in large cities of the former communist block, such as Bratislava, Warsaw, Moscow, and also elsewhere—Milan, Rotterdam, Vienna and Istanbul (Figure 11, 12). In 2001, following the terrorist attack on the World Trade Center in New York it seemed for a moment that the symbolism behind the skyscraper as the beacon of the liberal socio-economic order would cause its decline. However, the opposite has happened: skyscrapers are growing taller and taller regardless of terrorists, environmentalists, economists and everyday passers-by.

(11)

(12)

Figure 11**:** Bratislava, city centre from the Bratislava Castle. Photo 2018.
Figure 12**:** Warsaw, new development around the Palace of Culture and Science (L. Rudnev, 1952–1955). In the foreground: Złota 44 building (D. Libeskind, 2008–2013). Photo 2013.

3. HIGH-RISES VS. THE HISTORIC URBAN LANDSCAPE – CLASSICAL SCENARIO

'Contrary to what politicians and city managers maintain, high-rise construction and tall buildings do not offer a more economic way of urban land use. If they do, it is often at the expense of something else,' write Francesco Bandarin and Ron van Oers (2012, p. 124) in their defense of a respectful approach to historical urban tissue supported by the UNESCO *Recommendation on the Historic Urban Landscape* from 2011. Public polls in different types of cities confirm that high-rises are seen as neither ideal living spaces nor perfect working environments.

The debate over high-rises is a typical example of a discourse where rational arguments tend to fail. It is difficult to reach agreement between supporters and critics because some of the important motivations for one or the other position are hard to verbalize (the heritage value of a city without skyscrapers) or are intentionally hidden from the public (construction development as speculative investment).

Basically the same scenario repeats over and over: a strong developer supported by the local political administration proposes to build a high-rise or a whole quarter that would significantly reshape an aesthetically stable environment. In Europe, unlike in Asia, these new proposals are not designed to directly replace heritage buildings; if they do involve demolitions, these are usually defunct industrial buildings or a worn-out development from the 1960s or 70s. The investor chooses a celebrity architect as the project's guarantor, using attractive visualizations that promise cultivation of the public space in contrast with its the present neglected state. If the project is large enough, it usually includes a cultural facility—museum, theatre etc. Heritage conservators and the cultural public oppose the project, pointing to the aesthetic qualities of the existing urban landscape. Aware of the 'softness' of their arguments, they support their position using traffic congestion calculations and other quantifiable data as mentioned in the Introduction above. Typically of democratic societies, tiring discussions ensue with both sides using their own weapons: developers emphasize 'growth,' the volume of investment and the number of new jobs, while the other side relies on petitions, demonstrations and support from international cultural authorities. The project's architects enumerate their existing successful projects, cite historical examples of towers that were originally unpopular only to become icons later on (the Eiffel Tower), and emphasize the need to 'refresh' the purportedly dying urban tissue.

As of August 2020, Europe has three sites on the List of World Heritage in Danger: two of them were listed there because skyscraper projects are planned in the immediate proximity of key monuments. Liverpool—Maritime Mercantile City—was placed on the 'red' list in 2012. The historical centre of Vienna has been on the list since 2017 (Figure 13). The world heritage committee also monitors other cities where newly proposed high-rises collide with the values for which these sites became world heritage in the first place, such as Seville and Prague (Figure 14, 15). The author of this text is particularly familiar with the case of Olomouc, a former capital of the historical region of Moravia, featuring an extensive heritage reservation and a Baroque Holy Trinity column, a world cultural heritage monument. In this city with approximately 100,000 inhabitants, the communist apartment blocks, however intrusive, did not overshadow the city's picturesque historical panorama. It was not until the 1990s that new buildings began to change its silhouette (Figure 16). In 2008, a private investor proposed to build a high-rise in close proximity to the heritage reservation offering, precisely because of this closeness, attractive views for its future residents. The planned building later increased in height to reach 75 m and its construction was entrusted to Benoy, an international architectural studio. As of 2020, the matter remains undecided: the expert public maintains that the building would disturb the city's unique historical silhouette, while citizens organized one of the largest rallies since the 1989 anti-communist demonstrations. In the meantime, several parties have taken their turn in city hall with politicians oscillating between open and covert support for the proposal. After 2000, persistent civic activism succeeded in annulling or at least reducing high-rise projects in Vienna, Munich, Saint Petersburg and other cities. There are no records of rallies in favour of skyscraper construction.

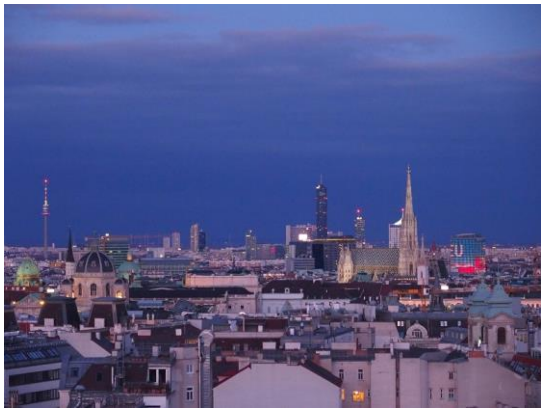


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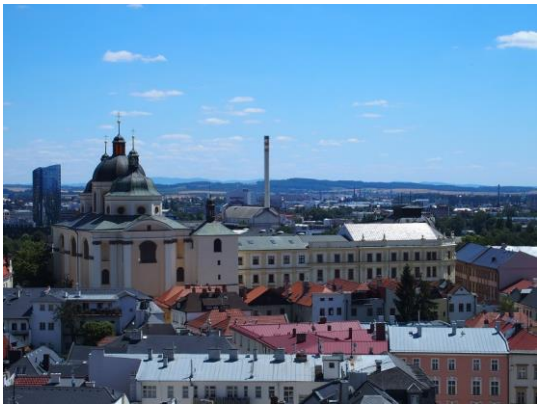
Figure 13**:** Vienna, Cathedral of St. Stephen, in the background: high-rises around the Donaukanal and Donau-City quarter. Photo 2020.
Figure 14**:** Seville, view from the cathedral. In the background: skyscraper Torre Sevilla, C. Pelli, 2008–2015. Photo 2017.

(15)



(16)

Figure 15**:** Prague, city centre, in the background: Pankrác quarter. Photo 2018.
Figure 16**:** Olomouc, Church of St. Michael, on its left: BEA Centrum, 2010–2013, on the right: smokestack of a thermal power station, 1996–1998. Photo 2018.

4. CONCLUDING REMARKS

A hundred and thirty years ago, when skyscrapers first established themselves on the architectural scene, their supporters and adversaries judged them based on both their height and style. Today, however, these qualities seem to merge; even in the case of heritage sites, regulations and methodologies are set to monitor building height with respect to the existing street line, but the buildings' style remains largely unregulated. In this respect, freedom is given to 'a contemporary stamp' as the *Venice Charter* (1964) puts it. And so when the sides seek to find a compromise solution, they haggle over the number of floors, while the architectural language is nonnegotiable.

Yet, as argued in this text, it is primarily the building's vocabulary, not its height, that decides whether the building will create harmony or disharmony with other components of the urban landscape. If this were not the case, tall Gothic towers would have been more irritating for the traditionally non-religious Czechs than the skyscrapers of the recent period. While UNESCO and international heritage specialists oppose the intrusion of skyscrapers on the traditional urban panorama, the old, uncontroversial skyscrapers are becoming the subject of protection: in 2017, the Early Chicago Skyscrapers were placed on the World Heritage Tentative List.

Both historical experience and simple observation lead to an unambiguous conclusion: if architects did not imagine that 'contemporary stamps' were primarily variations on the 1950s international modernist style and brutalism, their works would not have met with such resistance. The architectural fashion in the latest decades—the bending and twisting of functionalist and brutalist models in order to make them resemble everyday objects—does not seem to help the general consensus. These shapes that 'resemble something' then earn various popular nicknames, such as Gherkin, Walkie Talkie and Shard in the centre of London.

The second remark concerns the hierarchy of meaning: in the Middle Ages it made sense that churches (or mosques) were the most conspicuous buildings in the city. But what kind of building should dominate the city

panorama now? Today, our focus is on physical health and we see physicians as modern magicians of sorts: should hospitals scrape the sky then? Clearly not. Each community needs to answer this question for itself, taking into account local conditions, moods, and existing structure of the historic urban landscape.

The last remark addresses heritage values: Europe is the last continent where traditional landmarks remain the dominant element in the city. Thanks to this, towns and cities keep their unique, individual character, strengthen one's personal identification with the place (the feeling of being 'at home'), and attract tourists. Aren't these attributes in and of themselves the reason to protect the 'low-rise' character of our cities?

ACKNOWLEDGEMENTS

This contribution was supported by the Ministry of Education, Youth and Sports of the Czech Republic through a grant received by the Palacký University in Olomouc (project IGA_FF_2020_025).

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All photos were taken by Martin Horáček.

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POSSIBILITIES AND BENEFITS OF NATURE-BASED SOLUTIONS IN URBAN REGENERATION OF LARGE HOUSING ESTATES FROM SOCIALIST PAST

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ABSTRACT

Improving quality of life in cities, reducing their ecological footprint, and adapting them to climate change are three fundamental challenges that need to be urgently addressed because they have a significant impact on sustainable ecosystem functioning and human well-being, both at macro and micro urban level. The densification of existing built-up areas, often followed by loss and degradation of open space and greenery, pose additional challenges to ecosystem functionality and provision of ecosystem services, as well as to overall quality of life. Inherited large housing estates, one of the most striking spatial legacies of socialism whose future is considered as one of the key challenges in the urban (re)development of post-socialist city, are particularly exposed to densification. Modes of densification differ, but degradation and reduction of open public spaces and urban green space are common for all of them. Therefore, the active treatment of those changes/risks in the actions related to urban regeneration of large housing estates is of great importance. (Re)integrating nature and natural processes into built areas is increasingly considered as a solution to these urban transformation challenges, where nature-based solutions can foster and simplify implementation of those actions. This paper provides an overview of current state of knowledge on the effectiveness and implementation of nature-based solutions and their potential to the provision of ecosystem services, for climate change adaptation and for co-benefits. The focus is on the analysis of the possible co-benefits of nature-based solutions in processes of urban regeneration. Research is based on investigation of selective literature review and analysis of best practice examples.

Keywords: *nature-based solution, large housing estates, urban regeneration*

1. INTRODUCTION

In addition to rapid urbanization, globalization, migration and economic development processes, followed by numerous interlinked outcomes, climate changes are certainly the most influenced drivers that shape urban reality of today's cities and have a significant impact on ecosystem and human well-being, both at macro and micro urban level. The densification of existing built-up areas, often followed by the loss and degradation of open and urban green space, pose additional challenges to ecosystem functionality and provision of ecosystem services. In post-socialist city, inherited large housing estates (from here on, LHEs), one of the most striking spatial legacies of socialism whose future is considered as one of the key challenges in the urban (re)development, are particularly exposed to densification. Modes of densification differ, but degradation and reduction of public open space and urban green space are common for all of them. Therefore, the active treatment of this important LHE component in the establishment and implementation of strategies, projects and actions related to LHEs urban regeneration is of great importance. With regard to urban green and blue spaces, nature-based solutions (from here on, NbS) can foster and simplify implementation of those actions in

LHEs by taking into account the services provided by nature (Secretariat of the Convention on Biological Diversity, 2009), as well as other benefits.

This paper provides an overview of current state of knowledge on the effectiveness and implementation of NbS and their potential to the provision of ecosystem services, climate change adaptation and other co-benefits. Additionally, the research focus is on the analysis of the possible co-benefits of NbS implementation in processes of LHEs urban regeneration. Research is based on investigation of selective literature review and short analysis of best practice examples.

2. METHODOLOGY

In analysing the basic characteristics of NbS concept and its potential for the provision of ecosystem services, climate change adaptation and co-benefits, as well as in exploring the possibilities and benefits of NbS implementation in processes of LHEs urban regeneration, the methodological framework is based on an analytical approach which relies on description, observation and analysis.

3. NATURE-BASED SOLUTIONS: SETTING THE CONTEXT

Improving quality of life in cities, reducing their ecological footprint, and adapting them to climate change are three fundamental challenges that need to be urgently addressed (UN 2010). (Re)integrating nature and natural processes into built areas is increasingly considered as a solution to these challenges (Handley et al. 2007). In the wider discussions on climate change adaptation, rapid urbanization solutions, ecosystem services and role of green infrastructure, several ecologically-oriented urban development concepts were introduced in the last few decades. Four of the recently developed, which have gained prominence in academic debates and are increasingly referred to in policy-making, are the following: 1) nature-based solutions (NbS)(Balian et al., 2014); 2) ecosystem-based adaptation (EbA) (Munang et al., 2013); 3) urban green infrastructure (UGI) (Benedict and MacMahon, 2006); and 4) ecosystem services (ESS) (MEA, 2005). Due to the breadth of their definitions, multiple ways of describing and a wide range of interested stakeholders who promote them, it is difficult to establish clear differences between these concepts. The interrelationships, thematic scope, and current level of operationalization of this four concepts are shown in Fig. 1.

Broadly speaking, NbA may be considered as an umbrella to the other three concepts - EbA, UGI and EES (Naumann, 2014), but also depends on UGI and ESS for its further definition and systematic uptake in urban areas (Pauleit et al, 2020). EbA may be considered as a subset of NbS, that is specifically concerned with climate change adaptation via the use of nature (Pauleit et al, 2020). Compared to NbS and EbA, the UGI concept has had a clear link to the urban context from the start, strongly connected to urban planning and rooted in both urban landscape ecology and architecture (Fletcher et al., 2014). Regardless of the differences, these four concepts are closely interrelated, partly overlapping and partly complementing each other. They share many features, starting with multi-functionality and the provision of multiple ecosystem services, which are probably the most widely used within the four concepts to strengthen the role of nature in decision-making.

As action-oriented, NbS concept was introduced towards the end of the 2000s in the context of climate change (IUCN, 2009, Kabisch et al. 2016). There are different interpretations of this concept. For instance, IUCN (International Union for Conservation of Nature) defines NbS as: ''…actions to protect, sustainable manage and restore natural or modified ecosystems, which address societal challenges (e.g., climate change, food and water security or natural disasters) effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits' (Cohen-Shacham et al. 2016). More recently, EU defined NbS ''as solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions'' (European Commission 2016).

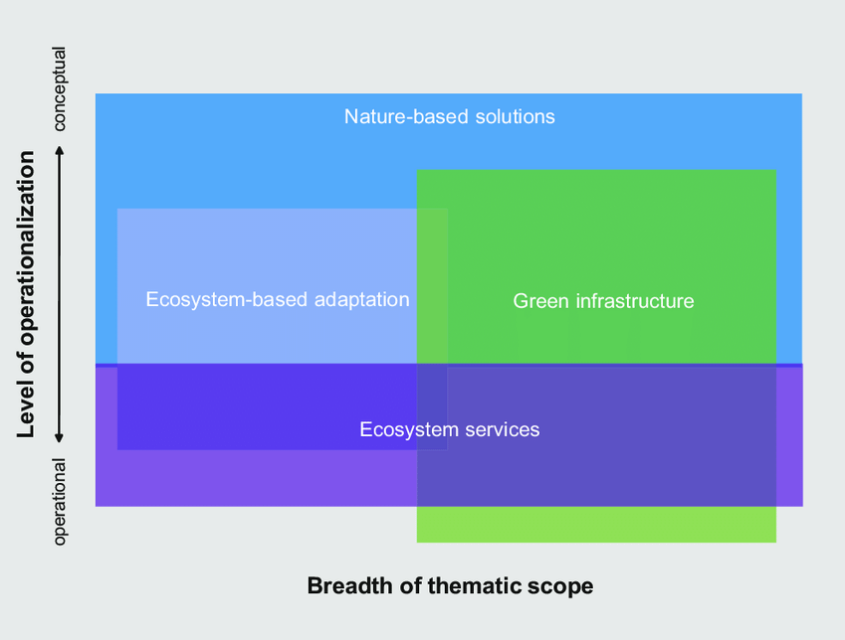

Figure 1: Illustration of the interrelationships, thematic scope and current level of operationalization of the four eco-oriented urban development concepts: NbS, UGI, EbA and EES
Source: Kabish et al. (eds.). Nature-based Solutions to Climate Change Adaptation in Urban Areas. Springer, 2017.

The main focus of EbA relates to sustainable management, conservation and restoration of ecosystems with the objective to provide services supporting humans' adaptation to climate change (Munang et al., 2013). IUCN suggested seven principles which comprise the core of this concept, including cost efficiency, harnessing both public and private funding, ease of communication, and replicability of solutions (van Ham, 2014), while Paulet et al. (2017) recognized four main characteristics of NbS: 1) NbS concept is broad in definition and scope (ranging from climate change and disaster risk reduction to addressing poverty, promoting a green economy to further economic growth and sustainability via NbS); 2) NbS concept is broad in terms of "nature" (ranging from the protection and expansion of forest areas to capture gaseous pollutants, planting wind breaks for soil conservation to the protection of urban green spaces or planting of green roofs for various benefits such as promotion of biodiversity, carbon storage and stormwater retention); 3) integrative and governance-based approaches to creating and managing the NbS concept are embraced; and 4) NbS concept is action-oriented.

NbS best practice examples include provision of urban green space such as parks and street trees that may ameliorate high temperature in urban environment (Gill et al. 2007), regulate air, water flows or flood events. In addition, building-based architectural solutions and elements, such as green roofs, green walls, or rain gardens may reduce temperature and save energy (Castleton et al. 2010), or reduce the impact of floods. Multiple benefits related to climate change adaptation and mitigation can be recognized by integrating NbS in urban landscapes. The most important are: 1) improvement of human health and well-being (Hartig et al. 2014); 2) better mental and physical health (Keniger et al. 2013); 3) more efficient and cost-effective solutions than more traditional technical approaches (European Commission 2015). The case studies also provide evidence that the NbS can be a practice that cities in transition can establish in the process of urban renewal to intervene and change the existing urban fabric, moreover, that NbS has a transformative social impact that contributes to social innovation in the cities (Frantzeskaki et al., 2019).

4. POSSIBILITIES AND BENEFITS OF NBS IMPLEMENTATION IN PROCESSES OF LHES URBAN REGENERATION

4.1. LHEs transformation in post-socialist period: Setting the context

The fall of socialism and radical political changes in the 1990s established a new social, economic and cultural environment which shaped a new urban reality of the post-socialist city in each former socialist Central East European (CEE) and South East European (SEE) country. Despite the differences caused by their different development paths, almost all cities have undergone similar post-socialist urban changes. One of them relates to inherited LHEs, one of the most striking spatial legacies of socialism, whose future is

considered as one of the key challenges in the urban (re) development of the post-socialist city (Vasilevska et al., 2014). Although massive privatization of the existing LHEs housing stock became the most common and powerful systematic measure in all CEE and SEE countries, previous research indicates that other types of transformations vary from one country to another, shaped by mode of LHEs transformation. Three types of modes can be recognized (van Kempen et al., 2005; Hess, Tammaru and van Ham, 2018): 1) *total neglect and decay of buildings, public open spaces and urban green space,* caused by unregulated development and planning conditions, lack of resources for maintenance, or by unwillingness of sitting tenants to respond to new responsibilities. In addition to degradation of existing buildings and public open spaces, a quantitative and qualitative decrease of urban green space occurs as a key change within this mode; 2) *uncontrolled and uncoordinated development and renovation* falling under the umbrella term ''do-it-yourself'' urbanism, exemplified by the individual building-based extensions and/or functional transformation of existing buildings, open spaces and urban green spaces. Within this mode, urban green spaces are also exposed to quantitative and qualitative degradation, primarily due to uncontrolled densification and increasing of building coverage ratio, but also due to the unwillingness or economic inability of sitting tenants to get involved in maintenance; and 3) *fully renovated housing stock and areas,* achieved through large and small-scale LHEs *urban regeneration projects* (Hess, Tammaru and van Ham, 2018), is enabled within the urban green space improvement and, realized in cases when the project refers to open spaces.

In the case of Serbia, it's specific development path created a complex urban world in which LHEs were exposed to uncontrolled development processes and became a suitable *"infrastructure"* for neoliberalization processes, where the patterns of divergence of LHEs transformation became more explicit, producing spatial and temporal differentiation of transformation types. In addition to massive privatization of existing housing stock, the following key LHEs transformation types can be recognized: 1) new infill market-oriented residential development (Vasilevska et al., 2014); 2) new infill commercial development; 3) multi-story extensions, in the form of additional stories or lofts on top of existing host buildings, with new flats for market (Vranic, et al., 2016); 4) a quantitative and qualitative decrease of public open spaces (Vasilevska et al., 2014); 5) the origin and expansion of small scale retailing and services through the transformation and adaptation of ground floor spaces of existing housing stock, so called 'garage capitalism' (Vasilevska et al., 2020); and 6) small scale extensions on the host buildings based on the individual actions, in terms of construction of new balconies, transformation of common spaces into flats, expansion of existing flats on the last floors, flat roof upgrades, etc. (Vasilevska et al., 2020). Shaped by specific development circumstances, marked by ''extended'' phase of transition, two post-socialist LHEs development modes can be recognized which are similar to those recognized in other CEE and SEE countries (Vasilevska et al., 2020): 1) *neglect and decay of existing buildings, public open spaces, and UGSs*; and, more present, 2) *uncontrolled and uncoordinated development and renovation,* with far-reaching consequences for the urban open and green space quality and quantity. The extreme CEEs and SEEs post-socialist LHE development strategy - *wholesale demolition of existing housing stock and whole area,* as well as *integrated regeneration* strategy, aimed to improve LHEs physical, social and environmental conditions, do not exist in Serbia.

Although modes of LHEs transformation and densification differ, common for all of them are greater or lesser extent of reduction and degradation of public open spaces (from here on, POS) and urban green space (from here on, UGS). Since the urban pattern of most LHEs is based on the principles of CIAM and international style, where generously dimensioned POS and UGS are one of a key characteristic, UGS has received increasing attention in the process of LHEs urban renewal, where its quantity and quality is often seen as one of the key drivers for LHEs sustainable (re)development. Therefore, the active treatment of this important LHE component in the establishment and implementation of strategies, projects and actions related to LHEs urban regeneration is of great importance. With regard to urban green and blue spaces, implementation of ecologically-oriented urban development concepts can foster and simplify implementation of those actions by taking into account the services provided by nature (Secretariat of the Convention on Biological Diversity, 2009).

4.2. Possibilities and benefits of NbS implementation in LHEs urban regeneration

It can be said that the origin of green urban concepts within LHEs is based on the socialist idea of the "collective dream". The playgrounds, public open space, greenery and landscape design of the backyards and courtyards in the LHEs during the 1950s to 1980s can be perceived as prior NbSs, since they contributed to human health and well-being, shaped the attractiveness of place, provided recreational and cultural value,

fostered social cohesion, and created places for communication (Dushkova and Haase, 2020). Although LHEs were exposed to significant urban changes and transformations after the fall of socialism, a large part of them has survived in most of former CEE and SEE socialist countries. In some cases, their values have been lost as a result of the densification, privatization, new infill development, new parking spaces etc. Densification of LHEs, interlinked by a number of pressures, including loss and degradation of UGS and POS, pose additional challenges to ecosystem functionality and human well-being within them. Densification process often leads to reduction of functions and services that urban ecosystems provide, in terms of reduction of possibilities for recreation, amenities and facilities of existing UGS and POS, connection with nature, psycho-physical regeneration of the individuals and/or different social groups, sense of community and social cohesion etc.

However, UGS within LHEs has potential to counteract these pressures by providing a number of environmental and cultural benefits while contributing to climate change adaptation and mitigation (Kabisch et al. 2015; Kabisch et al. 2016; Vasilevska and Vasilevska, 2019). Seen as social-spatial interventions in the process of LHEs urban regeneration, NbS have a transformative potential and impact to establish sustainable relations between people, urban space and nature.

The potential of inherited UGS and POS for implementation of NbS stems from the origin characteristics of the LHEs urban pattern, which is based on the CIAM principles and the international urban and architectural style. One of the basic principle were generously dimensioned open spaces and greenery. Although exposed to degradation during the transition period, precisely thanks to this initial characteristic, the spatial capacity of UGS still allows quality NbS and ESS provision, but only in the conditions of planned and controlled LHEs urban (re)development processes.

Exploring case studies based on a research approach which include balance between ecosystems and the social benefits of NbS, Frantzeskaki (2019) identifies seven principles/lessons for NbS (urban) planning in cities. Most of them relate to LHEs urban regeneration. The lessons are following: 1) NbS need to be aesthetically appealing for citizens to appreciate and protect them; 2) NbS create new green urban commons; 3) NbS experiments require and build trust between the city and its citizens both for the aim of the experiment and for the experimenting process itself. ; 4) different fora for co-creating NbS are needed that include and learn from urban social innovation; 5) NbS require a collaborative governance approach (they are often initiated by local governments and require multiple actors to be designed, implemented and linked to urban life); 6) an inclusive narrative of mission for NbS can bridge knowledge and agendas across different departments of the city and tackle with departmental disputes ; and 7) NbS need to be designed in such a way and scale that lessons for their effectiveness can be easily harvested and as thus, to be easily replicated into other locations.

The need to research best practice examples is also important to draw lessons for urban planning and urban regeneration of LHEs. Three examples are chosen. Two are from former socialist countries, Poland and DDR. The third is from Italy, but it is chosen because characteristics of the neighbourhood urban pattern are similar to those in the typical LHE.

4.2.1. Courtyard renovation “Plac na glanc”, Katowice, Poland

“Plac na glanc” is a project for renewal and revitalizing Katowice courtyards selected as part of a competition. The main objective was to revive the space and promote active living (Fig. 2). The organizer is *Katowice City of Gardens – Krystyna Bochenek Cultural Institution*. Revitalization includes the following activities: 1) preparation of a project in cooperation with architects and supervision over its implementation; 2) consultations and workshops with the residents; and 3) covering the costs of labor and materials. Architects initiated the greening of these courtyards and residents participated in the planning and realization phase of the project in a series of workshops in which they openly discussed and communicated about their needs and actions in contributing to the regeneration (Frantzeskaki, 2019). Recycled material was used for the renovation and later in the project, private investors were also involved. The initiative has been ongoing since 2013, and in 2019, the tenth yard was renovated.

Pocket park is implemented as a NbS type, while soil restoration and social capital through stewardship of places are recognized as co-benefits of the NbS that contribute to urban resilience. In addition, at *Dyrekcyjna 3 Street*, for instance, it was possible to create a place for children and the elderly, with tables, chairs, sun loungers and seats, which proves that even a small space can fulfil different amenities.

Figure 2: NbS implementation: Courtyard renovation "Plac na glanc", Katowice. Before and after.
Source: https://www.bryla.pl/bryla/7,85301,20793117,katowice-plac-na-glanc-czyli-remont-zaniedbanego-podworka. html

4.2.2. Green facades and walls for Leipzig, Germany – Programme *Kletterfix*

The programme *Kletterfix* was implemented in the time frame 2015 - ongoing, administered by the NGO Ökolöwe and the city department for urban green and water bodies. The former's employees offer guided tours in Leipzig to showcase best practice examples of greened facades that have been implemented so far due to the programme and thereby promote future action on behalf of citizens. Project aims are: 1) encourage tenants and landlords to take action with greening their facades on private property; 2) increase public awareness about the multiple benefits that green facades deliver apart from aesthetic functions; 3) improve general living conditions, carbon sequestration, urban health, urban microclimate, combat particulate matter pollution; 4) increase urban biodiversity by creating food sources for bees, ladybirds, bumblebees etc.; 5) generate economic savings for tenants based on reduced heating fees due to improved insulation and reduced maintenance costs for facades that are protected from the plants.

Green wall is implemented as a NbS type (Fig. 3). Improving the urban microclimate, general living conditions and combating particulate matter pollution are recognized as co-benefits of the NbS that contribute to urban resilience.

Figure 3: Green wall in Connewitz, Leipzig
Source: https://naturvation.eu/nbs/leipzig/green-facades-and-walls-leipzig

4.2.3. Regeneration of urban space into green space, Serpentone neighbourhood, Potenza, Italy

The regeneration of the urban space in the Serpentone neighbourhood in Potenza, Italy from a 'cemented' place to a green urban place started in 2010 after an architectural intervention was completed. The 'Ship', an underground building (Fig. 4), was never used since it was perceived by the local community as an imposed structure within the neighbourhood area. With a series of self-organized workshops of citizens, that later also included urban planners, resulted in a common project of a green space on top of the underground 'Ship' building so as to create a community recreation and connection place.

Urban park is implemented as a NbS type (Fig. 4), while sense of place, water retention and recreation are recognized as co-benefits of the NbS that contribute to urban resilience.

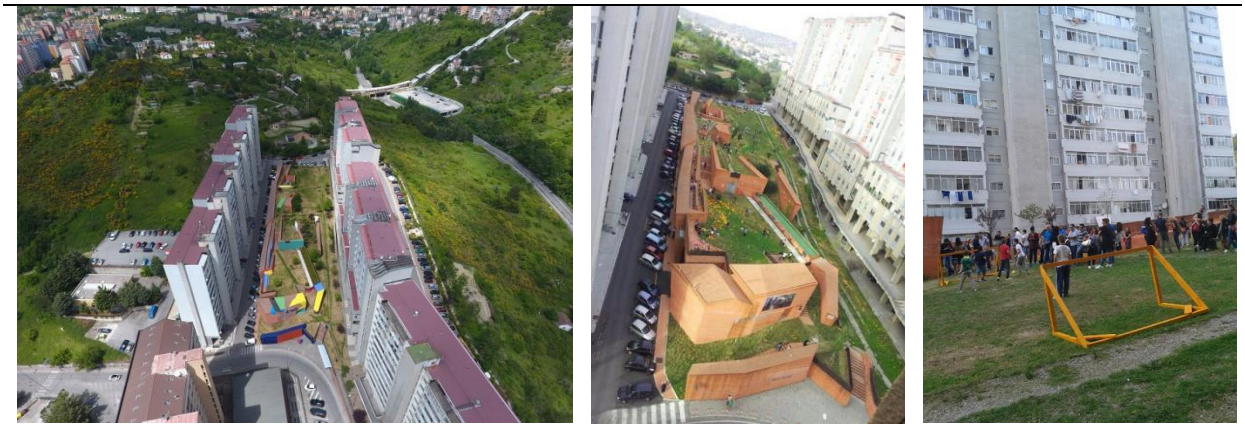

Figure 4: Transformation of concrete courtyard into green space, Serpentone neighbourhood, Potenza.
Source: https://www.gommalaccateatro.it/progetto/aware-lanavedegliincanti/

5. CONCLUSION

The analysis of NbS conceptual framework and short overview of NbS interventions within urban regeneration programmes and projects in European cities provides an opportunity to identify benefits, but also limitation and failure factors for implementation of NbS in LHEs urban regeneration. The key possibility for the application of NbS arises from the urban characteristics of the LHEs themselves. Since their urban pattern is usually based on the principles of CIAM and international style, generously dimensioned green and public open space are one of a LHEs key characteristic. Although exposed to degradation during the transition period, the spatial and functional capacity of urban green space and public open space within LHEs still allows implementation of NbS. Therefore, urban green space has been given increasing attention in the process of LHEs urban renewal, and its quantity and quality is often seen as a one of the key driver for LHEs sustainable (re)development based on eco-oriented urban development approach. However, it can be possible only in the conditions of planned and controlled LHEs urban (re)development processes. In practice, role of urban green and open space, its treatment and possibilities for implementation as a part of NbS depend of LHEs post-socialist development modes, which differ between former socialist countries, or between cities within one country. In addition to institutional and planning assumptions, the limitations of the application of the NbS stem from the nature of the concept itself. The following key limitations can be recognized: 1) lack of knowledge about the potential of NbS to address the challenges and which are best implemented; 2) lack of knowledge related to the potential co-benefits that result from NbS; 3) lack of knowledge about the functions nature provides to cities; 4) lack of technical knowledge on how to plan, build, and maintain NBSs; 5) gaps in the knowledge regarding the different stages of NBS implementation, as well as monitoring on the NbS impact.

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BANJA LUKA URBAN BACKBONE AS THE ARCHITECTURAL STATEMENT OF HISTORICAL DEVELOPMENT

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ABSTRACT

The paper tackles the relation of the historical timeline and major social, political, religious, and economic stages of development, on one hand, and urban backbone – the main street in Banja Luka, on the other, as a very precise statement of the city's DNA, directly coded on the single street throughout time, since the Roman period. Even though contemporary Banja Luka has developed only during the Ottoman era, series of settlements around the rivers of Vrbas, Crkvena, and Suturlija are recorded as early as in the pre-Roman era, leading to their later expansion along the main route connecting Roman provinces of Slavonia and Dalmatia. That very route, once only a primitive road, proved later to become the urban backbone, the most important street in Banja Luka ever since. All ruling regimes used it to solidify and exhibit their position either through the construction of religious, public, cultural and military architecture, open public, and green zones along, followed by its repeated renaming. Such an approach with long-term reflections, resulted in a very precise image of a single street as a statement of the historical timeline, witnessing its ups and downs. Present, very coherent, architectural heritage as the most solid evidence of mentioned development is reviewed in this paper, so that it is linked to ruling regimes, bringing up in focus the relation of each of the stages to their benefactors, examining their influence to the image of urban cityscape in Banja Luka, as it exists today.

Keywords: *Banja Luka, urban development, historical development, architectural heritage*

1. INTRODUCTION

The historical and contemporary urban backbone of Banja Luka is a street that stretches in the direction south-north, passing through the very heart of the downtown. During the Roman period, it was the stretch of the Salts Road located adjacent to the fortifications of the Roman settlements near the Vrbas river. During the Ottoman period, it connected Upper and Lower *Šeher* and was heavily used for the most prominent sacred and public constructions along its route, with the mosque in Lower *Šeher* as the focal point. *Kaiserstraße,* which was the new name of the road receiving the look and condition of a European street after 1878, when was expanded significantly during the Austro-Hungarian period with a number of newly established institutions – public, military and sacred, including Roman Catholic Cathedral, as well as private constructions that were built north from the old Muslim, Lower *Šeher.* After the WWI, the street was renamed to *Kralja Aleksandra,* and quickly after 1929, further expanded with palaces for the new administration and Orthodox cathedral church. Even after WWII, the practice continued; during the Yugoslavian era main city shopping center, city square, and new military headquarters, among others, were built, and after 1995, new national headquarters and government buildings were “squeezed” in free construction lots along the same street.

The paper first gives a very brief overview of key historical events that steered the development of Banja Luka, in order to properly assess its reflection on this single road, that got transformed from an ancient communication line to a modern 4-lane street. Starting with the Ottoman era, with first documented and some remaining traces of architecture, each of the consecutive historical periods is shown in the perspective of evaluated built heritage, linked to its functional and social role in the city. The architecture and the properties of the cityscape very much influenced by this urban backbone are evaluated and presented with its stylistic adherence, key facts, development, and current status.

The main goal of the paper is to address the architectural heritage of the urban backbone in Banja Luka – a single street that remained the focus of all authorities and rich inspiration for prominent achievements, decisively influencing the image of modern-day Banja Luka. It is intended to identify that all major construction activities, disregarding their benefactors, historical era, and function, took place along the same route, historically and today widely considered to be urban backbone of Banja Luka.

2. OVERVIEW OF THE HISTORICAL BACKGROUND

The development of modern-day Banja Luka does not differ much from any other middle-sized settlement in South-Eastern Europe, with a mild climate and satisfying topography enriched with a number of natural resources, mainly rivers and fruitful land. The first appearance of settlement on the place of modern-day Banja Luka dates back to the prehistorical era with archaeological findings unevenly spread around the modern settlement, still uninvestigated thoroughly, with new findings appearing almost daily during various construction works. A documented and structured approach to understanding the urban development in Banja Luka starts as early as in the Roman era when a station named *Castra* can be found on the place matching present-day Banja Luka. Its position can be seen in the 6th segment of 7-m long *Tabula Peutingeriana* on the so-called Salts Road, connecting the Roman settlement of *Servitium* (modern-day Gradiška) and *Salona* (near modern-day Split). After the dissolution of the Roman Empire, Slavic tribes soon took over the western Balkans, forming the first Medieval countries, predecessors of modern states on the Dinarides. (Malinović 2014, 31-33)

After the dissolution of the great Serbian state in 959, the town where will later be formed modern-day Banja Luka, was found in one of the newly established states – Bosnia. Later, during the centuries, it changed borders, sovereignty and independence, and crown rulers - both domestic from local dynasties and foreigners, mainly Hungarians. After 1463, and Bosnian defeat under the Ottoman campaigns, Banja Luka was located inside Banate Jajce, under the Hungarian Empire. Soon, in 1494, the first time in written sources, the name Banja Luka was mentioned. It was the muniment of King Vladislaus II of Bohemia and Hungary, in which he sought to help to protect the country against the Turks, and named all fortresses in the country (Magyar Tudományos Akadémia, 124) Such state remained until 1528 when the Ottomans took over remaining parts of the Banate. (Malinović, 2014, 33-37)

The Ottomans first seized the Upper *Šeher*, today corresponding to urban district *Srpske Toplice*, a suburban part of Banja Luka, arguably the site of a Medieval fortress, and very soon the Lower *Šeher,* modern-day downtown with preserved fortress *Kastel.* The first important year in this period is 1553 when the seat of Sanjak-bey was transferred from Sarajevo to Banja Luka, which marked new construction activities and settlement expansion along the route of Lower – Upper *Šeher* and further to the northern suburbs – creating the Tsar's Road, which is the recreation of the Salt's Road. The next important year is 1574 when Ferhad Pasha Sokolović came into power. This period is the first period in the city's history, which records extensive works, important sacred, public and private buildings construction, and infrastructure development. The prosperous period lasted until 1638 when Banja Luka lost its position in the hierarchy and degraded to *kadiluk* bringing its chart of development to a very flat, almost downstream line.

The Treaty of Berlin, established during the Congress of Berlin, happening between June 13th and July 13th 1878 was actually the revision of the Treaty of San Stefano from March 3rd 1878, bringing significant decisions for the future development of Bosnian Vilayet. According to the Treaty, precisely article 25, Vilayet of Bosnia and Sanjak of Novi Pazar, a historical region of Raška in Serbia, remained in Ottoman territory and under its formal sovereignty, but the Austro-Hungarian Empire got the permission to control the areas. Article 25 stated: *"The provinces of Bosnia and Herzegovina shall be occupied and administered by Austria-Hungary"* and continued *"... Austria-Hungary reserves the right to maintain garrisons and to have military and trading roads over the whole area of that portion"* (the Sanjak of Novibazar) *"of the ancient Vilayet of Bosnia."* (Albertini, 2005, 22-23) The occupation started just a week after the meeting in Berlin. Among others, the fiercest combat around Banja Luka was on August 14th 1878. Fights lasted until November 15th 1878, when King Franz Joseph I officially proclaimed the end of the occupation fights. (Bauer, 1971, 188-190) At the time of Austro-Hungarian occupation, Banja Luka was a rather small provincial town in Eyalet of Bosnia, and was later transformed not only in the architectural but also redefined in a social, religious, economic, and educational context, moving one step further towards the image of Central European town of similar size and acknowledgment. The decisive role in construction activities was led by the K. u. K. Army forces, primarily through the construction of railway infrastructure and stations, as well as an immense number of military facilities and whole cityscapes that were enclosed for their activities. The core of the activities was concentrated northern from Lower *Šeher* on the section of the Tsar's Road through the *Latinska varoš*, avoiding interference with Muslim settlements.

During the era of Kingdom (1918-1941), the most prosperous time in terms of development was after the introduction of *banates.* Vrbas Banate was established on 3rd October 1929, with Banja Luka as its capital. Its first and most important governor was Svetislav Tisa Milosavljević, who was in power between 1929 and 1934. Its ruling time brought a vast number of public constructions, very much leaning to the urban matrix of Austro-Hungarian *Latinska varoš* with the dominant axis of *Bulevar kralja Aleksandra,* former Austro-Hungarian. Significantly, Milosavljević's intentions left enough free space that proved to be decisive for urban development after World War 2.

The longitudinal axis of *Bulevar kralja Aleksandra*, later renamed to *Titov drum,* formed along a strong and logical communication stream, was recognized as too strong and was on the way to be "dissolved" with new focal points of development along the Vrbas River, as planned in 1952 by Federal urban planning Department located in Sarajevo. (Savić, 409) Unfortunately, a natural disaster caused by a great earthquake in 1969, stopped such activities, and later led to the completely new plan, that retained the longitudinal plan, with the axis of development in the offset to the historical backbone in the downtown.

Late XX and early years of the XXI century, with civil war and its chain of events, still recognized as the highlight in the historical timeline, as of today, did not positively affect the cityscape. On the contrary, the isles of greenery along *Kralja Petra I Karađorđevića,* which is the latest and current name of the backbone, and unused public spaces have been converted to construction sites - continuously harming not only historical layers of architecture but the atmosphere, the luxury of green zones, the parks, and the climate, with constantly arising traffic contributing to overheating in the downtown.

3. THE URBAN BACKBONE ORIGIN AND DEVELOPMENT

3.1. The Ottoman era (1528-1878)

The layers of architecture prior to the Ottoman era, except the *Kastel* fortress itself, which is the fusion of the Medieval core and the Ottoman add-ons, do not exist along the route of the researched zone. During the Ottoman era, the only prosperous period for the development of Banja Luka, in terms of urban, social, and economic context, was 1553-1638. At the time, Banja Luka was the seat of Sanjak-bey, among which the most important were Sofu Mehmed Pasha (Mevlevi Mehmed Pasha) and Ferhad Pasha Sokolović. During their rule, Banja Luka received the image of a typical Ottoman provincial town. In its vast part, it was developed around the walls of *Kastel*, with its site fixed as early as in the Roman period. It was the Vrbas River that was the southern backbone of the development and many of traces of Ottoman era are still visible and preserved in the architecture of urban fabric in southern suburbs of the city – dominant mosques with belonging graveyards that marked the positions of *mahalas* – residential settlements, groups of small single-family houses in an irregular urban pattern, with narrow streets and walls outlining the borders between neighbours. Non-Muslim settlements, in majority Serbian, Croatian and Jewish, were located in the northern part of the town, which started to develop more after the *tanzimat* in 1839. (Bejtić)

However, the old Roman route, indicated and obviously used as the main road along the fortress and upstream the Vrbas River, was recognized as the potential backbone, later proven to be correct. At the junction of the road, which was, by the end of the Ottoman era, also known as the *Tsar's Road,* and the *Kastel's* western entrance, the *Ferhadija* mosque with the Clock tower – *Sahat kula* were built. Mosque's construction was financed by Ferhad Pasha Sokolović, for which he commissioned one of the Mimar Sinan's pupils. In its stylistic adherence, it belongs to the classic Ottoman architecture of the XVI century, for which it is widely recognized as one of the greatest achievements in the Vilayet and wider. (Husedžinović, 229-241) Besides being the National Monument in Yugoslavia, it was listed as the UNESCO protected heritage site. It was demolished in 1993. Fully restored and equipped according to the original state, it was reopened in 2016. Another important Ottoman construction was *Bojića Han,* located on the far northern stretch of the road. Han is a typical Ottoman site, usually consisting of a multifunctional market, trade exhibition areas and so to say, motel facilities. *Bojića han* is one of six *hans* to be preserved until the end of the Ottoman rule and recognized as one of the most equipped. It was demolished during the Austro-Hungarian era. (Ševo, 46) Almost at the end of the Ottoman power between 1858 and 1860, the road was widened, which was very important for the later stages of development. (Savić, 404)

3.2. The Austro-Hungarian era (1878-1918)

Diversely from other occupied cities in Bosnia, the urban fabric formed during the centuries of the Ottoman presence was preserved, and foreign engineers moved the focus of the new European *varoš* away from the Ottoman *čaršija* and the Vrbas River, towards the so-called *Latinska varoš*. Newly-come engineers showed sensibility towards oriental expression in the architecture of Ottoman *mahalas* and used a natural border, the flow of the Crkvena River, close to *Ferhadija* mosque, to act as a border between the old - Ottoman and the new – Austro-Hungarian Banja Luka. In that setting, as early as in 1879, the construction activities on numerous public buildings started. In the majority of cases, new authorities built prevalently buildings for newly opened institutions and facilities like railway stations, banks, hospitals, courts, schools, industrial and military facilities, which did not exist to such an extent in the prior system. The majority of those constructions were located along the *Kaiserstraße.*

Except for very few examples, like *Elementarschule* in Upper *Šeher*, done in Orientalizing stile in 1896, by Franz von Mihanovich, (Hartmuth, 185-186) the development was focused on the northern, at the time, suburbs, with predominantly non-Muslim settlements, and underdeveloped infrastructure. At the time, the recently widened main road, renamed to *Kaiserstraße,* was wisely used to back up the future modern city, opposing the aforementioned old Ottoman *mahalas* located between Upper and Lower *Šeher* - two centres of medieval Banja Luka developed on the mouths of Suturlija and Crkvena rivers into the Vrbas.

Closest to the Ottoman urban fabric were built the Prison or the "Black house" (1889) and the *Tsar's School*, also known as *Volksschule* (built 1885, reconstructed 1907). Its architecture strangely combined the traditional *Dinara house* with Classic Revival elements and French garden oriented toward the *Kaiserstraße.* It was demolished in 1969, and on its site later built the Faculty of Electrical Engineering. (Malinović 2018)

On the northern side of the mosque, a Muslim library or reading room was built. As originally named, *Kiraethana* was located on the western side of the Ferhadija mosque, oriented towards the Kaiserstraße. The project was done by Croatian architect Ćiril Metod Iveković (Krzović, 28), most notable for Sarajevo and Brčko City Halls. *Kiraethana* was built in 1890. (Ševo, 95; Hartmuth, 186) It was demolished between WWII and the 1969-earthquake. It was done in Orientalizing Style. It had a square base with the ground and one level above, distinctively traced with simple cornice. The façade was done with horizontal stripes of probably dark yellow and red or orange colour. Windows were arched, with the wooden segmented layout in a glass pattern. The northern corner oriented towards Kaiserstraße was accented with a wooden oriel bay, often seen as *divanhana* element in traditional houses.

Northern from *Kiraethana*, along the *Kaiserstraße*, were built a Renaissance Revival *Banja Luka Stadt Bahnhof* (Main Railway station) in 1891, *Herrengasse* – major pedestrian and shopping street in the city (adjacent to *Kaiserstraße),* and Military headquarters – *Militäramtsgebäude* in 1879*.* Local settings developed around those buildings played a role of huge importance for future development in Banja Luka, since they traced other streets, avenues and vast number of other important buildings in that and later eras. (Malinović 2014)

Beside state-funded, many projects were developed for the Roman Catholic Church that was an important stakeholder in all aspects of life in Banja Luka, not only religious. Church managed to retain and expand their possession in the downtown, resulting in several constructions of churches, luxurious residential houses, and schools, as well. Serbian Orthodox Church also had great possessions in the downtown, but in the Austro-Hungarian time, their activities did not result in many appreciated pieces of architecture.

The most important site for the Church was the Cathedral Church with the Diocesan headquarters, located just beside the *Militäramtsgebäude,* on the eastern side of *Kaiserstraße.* The Cathedral was built in 1884-1885, namely according to the project done by Eberhart Wegnant, the author of a vast number of sacred buildings in Banja Luka (Malinović 2016). The original church was damaged in an earthquake in 1969 and later demolished. Another important building erected by the Roman Catholic establishment was the School of Adorers of the blood of Christ. The school building was located on the western side of *Kaiserstraße,* across the *Militäramtsgebäude*. It was completed in 1903 and was certainly one of the most prominent secession buildings in Banja Luka at the time. Simple corpus geometry, shallow Avant-corps with emphasized gable wall, everything followed by strong structural decoration with floral motives, which were levelled up from the ground zone to the peak in the mentioned gable. The school was operating until 1943, and on 18th September 1946 due to the nationalisation process, the building was confiscated and a public Gymnasium for girls was founded in it. That school was operating until 1969 when it suffered earthquake destruction and was torn down. (Malinović 2018)

Along the *Kaiserstraße,* on its eastern side, the northmost site, once occupied by *Bojića han*, developed in this era was yet another army site - the recovery hospital with a vast green park. It was later proven to become the major green zone in the city – today named park *Mladen Stojanović.* Next to the park, on its southern edge, another sacred building was built, Evangelical church and the parish house, designed by Ludwig Huber in 1895 in Classic Revival Style. After WWI it lost initial function but is still in use as an office building with most of its architectural features preserved. (Preradović et al, 102-105)

Industrial facilities were built along the *Kaiserstraße,* as well. A complex of buildings for *Tabakfabrik* - Tobacco factory was built on the site between the Cathedral and the railway station *Kaiserstraße.* Even though it was built according to the typical project without remarkable architectural values, its contribution to the landscape combined with preserved architectural properties is unique for industrial archaeology in Banjaluka, which is the Tobacco factory part of. (Malinović 2014, 111-113) Between the Evangelical church and the Tobacco factory, another railway station, *Kaiserstraße Bahnhof* was built around 1891. It is located on the "Y" track-split towards the tobacco factory. A small station building, done in Historic Revival with oriental influences, was used until 1969 when it lost initial function, and now being used as a restaurant.

Almost parallel to the Cathedral, Tobacco factory, and partly the park plot, the western side of *Kaiserstraße* is occupied with the series of exclusive urban villas *(Kaiserstraße Villagegend)* built either for highly ranked generals or diocesan officials. They are all built according to authentic residential architecture as seen in XVIII and early XIX century in high hills in Austria and Switzerland, which makes them very unique, and odd at the same time, for the local setting. They are still being considered as the most valuable residential houses in Banja Luka. (Malinović 2014, 157-163)

Beginning with the *Militäramtsgebäude* and ending with park *Mladen Stojanović,* the whole ambient with the cityscape is recognized as the national monument. (National monuments)

3.3. The Kingdom (1918-1941/45)

Even very modest, later resulted to be decisive, infrastructural projects and constructions were undertaken during the occupation and annexation period (1878-1908 and 1908-1918) were not perceived as such at the time. Only later development stages outlined how correct were the decisions drawn up in 1878-1918. During the Kingdom of Serbs, Croats, and Slovenes, then the Kingdom of Yugoslavia, primarily in the period of the *Vrbaska Banovina* 1929-1941, it appeared that all significant planning activities were taking place among focal points set during the Austro-Hungarian time, and new constructions were taking place adjacent to upper mentioned buildings.

Northern from the *Ferhadija* mosque, a site with a mosque and the Muslim graveyard from the Ottoman era was demolished. On the site of the mosque, on the eastern side of the *Kaiserstraße,* a modern hotel, *Palace,* according to a project done by Dionis Sunko, was built in 1933, (Vidaković 2006, 60-67) and on the western side of the street, the park devoted to writer Petar Kočić, that will in 1932 receive a famous sculpture done by Antun Augustinčić and Vanja Radauš. (Savić, 407)

The most recognizable construction done during the Kingdom was for sure the complex of *Banski dvor* and *Banska uprava* – Palace for the regional governor and the Town Hall. The buildings were erected in academized Byzantine Revival architecture with elements of Classic Revival, in 1930 and 1931, respectively, according to the projects done by Belgrade architects Jovan Ranković, Anđelija Pavlović, and Jovanka Katerinić-Bončić. The Orthodox Cathedral church of the Holy Trinity was built between the buildings of *Banski dvor* and *Banska uprava* in 1925-1930, according to a project done by Belgrade architect Dušan Živanović. It is considered to be one of the peaks of Byzantine Revival sacred projects built in the pre-War era in Yugoslavia. It was demolished in 1941, at the very beginning of WWII. (Vidaković 2006, 25-35).

Another important building erected during the Kingdom was the first multi-family residential building in Banjaluka, built for the new administration staff, located on the site next to the Park Petar Kočić. It was designed by Edgar Kobenzl and constructed in 1929, with distinctive elements of late classic revival architecture combined with modern housing systems incorporated. (Cvijić, 87)

The *National Theatre,* at the time *House of king Peter the Great*, was built also on the western side of the *Kaiserstraße,* on the site close to the Ban's Palace and next to the *Militäramtsgebäude* in XXXX. It's stylistic adherence, even very often recognized as a reflection of the Bauhaus, combines Modern and elements of Classic Revival architecture, still very much preserved in original state and function. (Vidaković 2006, 93-99)

3.4. The Yugoslavia (1945-1991/5)

During the Yugoslavian era, the development of *Tito's drum,* which was the new name of the urban backbone, was not as intense as in previous eras, until the great earthquake that stroke the city in the autumn of 1969. Before, very few new buildings were erected along *Tito's drum*.

First, in 1955, a headquarters of the Post Office, was built by Bogdan Stojkov on the eastern side of *Tito's drum,* next to the residential building for civil servants. (Stojkov) It was designed with elements of the International Style, and a very distinctive white-grey Bauhaus colour scheme, very much like the high-rise administrative building of the company Čajavec, built across *Tito's drum* in 1965-1967. On the place where former *Kaiserstraße* was divided in the pedestrian-only zone and formed the *Herrengasse*, an administrative building of the company Čajavec, was constructed. At the time, with its 13 stories, it was the highest building in Banja Luka, overseeing the entire landscape of low-rise structures. It was the work of a local architect, Josip Vidaković, with quite a clear reflection on International Style. Both buildings are preserved in the original state, with the original function. (Vidaković 2011, 259; Savić 408)

During the earthquake, the downtown suffered intensive damages, causing a number of subsequential demolitions, like Bosna hotel, located across the Orthodox Cathedral, or Titanik building, just to name a few. After the demolition of the Titanik building, which was located adjacent to the *Palace* hotel a huge space opened up. In 1974, as a result of vast international competition, a project for a gigantic shopping centre and public square was selected for construction. Designed by Velimir Neidhart, Ljeka Lulić, and Jasna Nosso, as a very careful combination of Socialist Modern and architecture of Brutalism, *Boska,* at the time was the biggest centre of its kind in whole Bosnia and Herzegovina. (Savić, 409-410) It still marks the Krajina square, now with changed and adapted function, according to new shopping "laws".

After the demolition of one fairly small part of *Herrengasse*, it was replaced by market house *Triglav* in 1982*,* now named *Kastel,* according to the project of Nebojša Balić. (Balić et al) It reflects very well the approach in the architecture of the 1980s, that was "stuck" between Western-European trends and locally enrooted Socialist Modernism.

On the place of demolished School of Adorers of the Blood of Christ, the authorities entitled the Yugoslav Army to govern the site, which was historically complementary action, with former *Militäramtsgebäude*, in post-earthquake time *The Archives* building, sitting just across the road. On the site of the demolished school, Army's Cultural Centre was built in 1974-1975, according to a project done by Kasim Osmančević. (Vidaković 2011, 266) It is currently being used as a National Assembly. Next to it, a piece of Brutalist architecture, at the time serving also to the Army Headquarters, was built in the early 1980s. In the recent era, it was the seat of the national Government, and now being used as the administrative building for a series of national agencies.

3.5. Bosnia and Herzegovina (1995-)

The recovery period after years of war damage in some aspects still lasts. Even though direct fights were not taking place in Banja Luka, economic growth and social image during the period 1991-1995 left scarce traces in the urban fabric that was in fact frozen for long in the post-war era.

During the war, the reconstruction of demolished Orthodox catherdral church began, and its full restoration was completed in early 2000s', bringing back the secular and religious heart of modern-day Banja Luka, as it once was. The southern part of the *Kralja Petra I Karađorđevića,* which is again the new name of the urban backbone, did not change much, except for one construction taking place at the turn of the centuries. It was business centre *Ekvator* done in late Postmodern expression by Budimir Sudimac, Milan Vujović, and Uroš Fišić. Another example of the late expression, now International Style, is the seat of national institutions located on the opposite, northern side of the backbone. Squeezed between the Tobacco Factory and the park *Mladen Stojanović,* just behind the building of *Kaiserstraße Bahnhof.* First, in 2006 began the construction of two high-rise buildings for a national telecommunication company. Later, the Government decided to buy and convert the site for offices of various use, including the agencies, ministries and the PM. This, the latest addition of larger scale, besides being the biggest administrative complex in Banja Luka shows very well how the post-war development works: largely questionable treatment of heritage and cityscape preservation, unclear architectural aesthetics and misuse of early-XX century principles in early XXI century.

4. DISCUSSION

Certain cases of a similar approach, either planned or ad-hoc, in the occupation of single streets or limited urban zones for the pivotal governmental, public, sacred, and other prominent functions, are courtesy of many other towns, Europewide. What makes very distinctive the case of Banja Luka is the series of overturns in historical development, always followed with new political regimes, which here shown, always remained within the same spatial zone of interest – single street, or the urban backbone. That opposes the fact that those overturns were actually the opportunities to make some extensive shifts in planning and downtown expansion, possibly redirecting it to other city districts. Moreover, even in far distant historical discourse, it is proven that the same street remained the scope of the most powerful landlords, with either private or public background.

It is only to assume how would the city be developed if all those constructions took place elsewhere in other urban zones, and how would it reflect urban development and its sustainability in general. One has to admit, that the XXI century brings yet another overturn in social patterns and actions, that will eventually reflect urban fabric and the image of our cities in the future. The most recent activities along the backbone, like ongoing violent demolitions along the group of villas, act as yet another evidence coded in the historical timeline. Those are typical moves in the post-war era in transitional countries, where laws are intentionally avoided, and sanctions for the violators as well, leading to undoable mistakes and damage to the aesthetics, heritage and perception of a certain cityscape.

5. CONCLUSION

Starting with the Ottoman period, the main street in Banjaluka – the urban backbone, established as early as in the Roman era, received its first buildings of pivotal importance. All consequent development eras, marked with different political and national regimes, kept its focus of construction activities along the same route, which was modernised and enlarged over the time. Its current image entails of stylistic fusion spanning from the classical Ottoman to entirely glazed buildings, from single-family villas to administrative high-rise buildings. It shows very consistent reflection of all historical stages of development translated to the major architectural achievements of the time. In that regard, the idea behind this work is to re-evaluate the role of the architectural development in Banja Luka, but not in a certain period or exact time, but along a historical timeline and along the exact route, proven to be the major street – the urban backbone of this 2nd largest town in modern-day Bosnia and Herzegovina. Even though the image of Banjaluka rests on very colourful, separated and secluded stories, such as its greenery planted by the Austrians, vast public and sacred constructions undertaken during the Kingdom, and strong development activities taking place in the post-Earthquake period, very few consider the present-day Banjaluka in the perspective of a mutual relationship between each of those layers as seen in the main street – today *Kralja Petra I Karađorđevića.*

This work uses an established methodology of research and explication patterns in order to clearly review, analyse and present the architecture that forms the urban fabric along the examined urban backbone. The paper relates historical development with its reflections to urban development, emphasizing the spatial displacement of leading activities, which are all proven to be located in the same street.

The urban backbone in Banjaluka is a huge resource in terms of layers of architecture that testify architectural development in general, and besides, it is a living document of historical timeline with very specific and recognizable statements reflected through built environment.

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ICUP2020
international conference on urban planning

THE DEVELOPMENT OF CONTEMPORARY URBAN TRANSPORTATION IN RELATION TO URBAN STREET NETWORK

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ABSTRACT

Mobility - and urban transport systems enabling mobility – is an essential ingredient of city life. Good urban transport systems need to ensure that people (labour force and consumers) and goods move between different locations within the city. Nowadays, cities are seeing new trends emerge regarding the future of transportation. Currently, digitization in networks and the need to provide travel aid for more citizens are two areas of innovation that cities are researching. While each city varies in its development stage and creates its own innovation plans, being able to meet the increased traffic of its own citizens and tourists is crucial. The 21st century sees technologies rapidly changing and smart devices more and more connected to each other. With the change in technologies transport means are also changing to give a feedback to the needs for an effective and smart transportation system. Technologies including smartphones, GPS devices and digital ticketing are driving an increase in the collection of data about the attitudes and preferences of people regarding their everyday travel. These data can be used to improve the way transport networks are planned and real-time analysis gives access to time sensitive information, allowing decisions to be made in real time. The increasing use of automation is important and will be an important part of todays and future urban transport development processes. These technological advances can also enhance the understanding of how cities function.

Keywords: *urban transportation, urban street network, intelligent systems, information and communication technologies (ICT), smart urban transport*

1. INTRODUCTION

Transport always influenced urban development including the evolution of urban street network. It is a complex system that depends on multiple factors, including the pattern of settlements, the organization of production and the availability of infrastructure. Transportation systems have a significant impact on the patterns of urban development and on the location choices of households and businesses. Over the last decades urbanization have led to enormous growth of urban settlements and their transport networks. For almost a century the motorized transport has ousted people in determining what should be the scale of the urban environment (Nozharova, B. 2020). In this regard one of the hardest tasks for professionals and policy makers is the creation and implementation of models of a complex transport system. Such which would satisfy the needs of fast changing cities and towns together with their inhabitants necessities and preferences. Jeff Speck states that to function properly, cities need to be planned by generalists (Speck, 2012). Generalists are coming to understand that expanding the urban street network to satisfy the needs of motorized transport is just a very expensive short time solution to the problem of urban traffic and just couple of years later leads to more traffic. The era of automobile dependence has proven that solutions, that are product of very specialised experts (transport engineers for instance), work against city's inhabitants. The development of urban street

network and transportation affects people's daily life a lot as we spend much of our time on the streets and using various transportation modes while travelling. But namely people dwelling a settlement, a residential area or a neighbourhood are those for which the urban environment is built (Slaev et al., 2019) and no one, even the best professional, knows the interests of others as well as they do. (Slaev et al., 2018).

The world is entering a new era of mobility and city's street networks will need to be adapted to these changes. There are shifting patterns in where and when we travel, whether for work, school, services or entertainment. The 21st century sees technologies rapidly changing and smart devices more and more connected to each other. With the change in technologies transport means are also changing to give a feedback to the needs for an effective and smart transportation system. Transportation modes are part of the system and are also changing. From scooters to early semi-autonomous vehicles and new types of buses. People are demanding more out of urban streets network every day – from ride-share to next-hour delivery.

The next generation of streets will probably not look like a futuristic sci-fi film, at least not so soon. Scrapping entire road systems is not feasible, so generalists should find answers for the reorganization of the existing urban street network according to the future trends. At the same time, people have certain expectations of what our streets should look like and how they should perform – ranging from safety and ecology to economic development and transportation network connectivity goals.

Dynamic changes has led to some dynamic debate about the type of streets cities need, and want, in the future. There have been long-view urban design speculations, promotional concepts by technology developers, plans for entirely new cities and districts, and guidance from transportation-sector organizations. For new cities and urban districts, a blank canvas approach can be taken to designing new streets. But the majority of European cities, on the other hand, are mature cities with an established structure and fabric.

2. FROM THE PEDESTRIAN CITY TO 21ST CENTURY MOBILITY

Cities are shaped by many historical and geographical features, but at any stage in their history transportation evolution changed their size, form and land use patterns. Innovations led to the emerge of new traffic and transportation systems. They formed the basis of new and more complex urban systems building on top of the original walking city fabric. First, the public transport patterns and then the automobile patterns have enabled the growth and enlargement of cities. New patterns replace some of the old elements, functions and qualities but the three basic one – walking, public transport and the automobile still exist and are still evolving.

Streets and roads, as part of the urban street network, represent an essentially permanent backbone that shapes all other dimensions of urban form and land use. It will not be exaggerated to state that transportation infrastructure is the circulatory system and lifeblood of urban settlements. From first ancient settlements to today's megacities their shape has been defined by technologies that allow commuters to get to work in about 30 minutes. Until the Industrial Revolution, there was pretty much only one way for most people to move inside the city walls - on foot. With services concentrated in the city center, the radius of development from the heart of the city was limited to not much more than 2 kilometers—approximately the walking distance whitin 30 minutes. The boundaries of the ancient city were limited by transportation technology. So as these old cities grew, they became denser and stayed compact with more-or-less concentric shape. In the pre-industrial age, commuting from a rural estate to a job in the city wasn't possible on a daily basis (English, J., 2020). The industrial revolution brought additional populations migrating from rural to urban in search of a better life. During that period new forms of transportation appeared.

The steam powered public rail boosted the first real change in the urban morphology and urban street network. New settlements emerged in the suburbs near the railway stations. The commuting distance from the city center grew up to about 16 kilometers away from urban core but keeping the 30 minutes isochron. This transportation remained limited to the upper class. For the needs of urban masses, a different mobility technology, the Omnibus, emerged in France. In the year 1826 the first omnibus services appeared in the form of a horse-drawn passenger wagon. It was the first land-based innovation in public transportation. Six years later, in New York, the omnibus was adapted to a fixed rail system to provide passengers with smooth ride. These early buses carried up to fourteen passengers in the beginning to reach a capacity of up to 42 passengers, and some even featured two stories with an open top. But people desired for a faster and less malodorous form of mass transportation (English, J., 2020).

The invention of bicycles and electric streetcars created a revolution in urban travel. The first electric streetcar system entered service the late 19th century in USA and was quickly spread across the word. The operating speed of electric trolley was three times faster than that of omnibus and did not generate wastes. In practice, streetcars and bicycles could cover more than 6 kilometers in a half-hour. With the help of this innovation in urban transportation cities ware no longer stuck in the 2 kilometer walking distance. The developable areas grew exponentially. And with the help of the elevated trains (in USA) and the underground network (in Europe), citieswere able to spread outward 20 to 30 kilometers.

The combination of technologies (rail, cars, metro, e.tc.) created the form of cities before World War II. Dense downtowns had high-capacity rail transit radiating outward—subways and elevated trains in big cities, which produced apartment suburbs that were relatively high-density and streetcar suburbs, with single-family homes and townhouses. Some of the richest people lived beyond, in small towns and on estates accessible to the central city by railroad. Cities in the 1920s and 1930s spread a little bit more than they had when everyone relied on the streetcar. But this trend began to change, first slowly and later dramatically, due to the mass car production and the emerge of the new type of road networks – the highway.

In the second half of the 20th century, the massive diffusion of the automobile, as well as the construction of highway networks, had substantial impacts on urban mobility/urban street network. Highways were built to connect the urban core to the periphery and, in many cases, complete or partial ring roads were built. The mobility freedom offered by the private car represented a paradigm shift in terms of lifestyle, consumption patterns, as well as residential locations. The car on the freeway enabled large numbers of people to travel long distances on a day-to-day basis. Within a short period, the automobile became the dominant mode of travel in most cities around the world. Instead of small railroad suburbs, where housing was restricted to a short radius around stations, drivers spread out across suburbs could now commute more than 30 km in 30 minutes. If the streetcar city covered 80 square kilometers, the 60-kilometer-diameter expressway city could cover over 2000 square kilometers (English, J. 2020). The automobile reduced the time for traveling considerably, but together with its positives it caused many problems in people's daily live. Motorization and the diffusion of personal mobility have been an ongoing trend linked with substantial declines in the share of public transit in urban mobility (Rodrigue, J.-P., 2020).

Based on the information presented in this part of the paper in Table 1 and in Figure 1 there is a comparison of the three main transportation modes that shaped the urban fabric throughout the centuries, including the street networks.

It is crystal clear that with the evolution in transport technologies and the increase of mobility cities change their size and alter the spatial distribution of economic and social activity centers. As transportation got faster, cities got bigger and undoubtedly people, like it or not, owe this change to automobiles. Most cities in the world today are struggling with the problem of the car. Why some cities achieve good results in becoming more public transport-oriented and walkable, and others less so, is a complex issue involving urban governance, economics, transport planning, town planning and other factors such as vested motor car interests.

Table 1: Comparison of different urban patterns with respect to different transportation. Based on Newman et al, 2016 and Lindelöw, 2018

	Walking city	***Public transport city***	***Automobile city***
Optimal dimensional radius	*0–2 km*	*0–20 km;*	*0–40 km*
Average speed	*5 km/h*	*20 km/h*	*40 km/h*
Land use / population density	*Evenly distributed*	*Dense and concentrated around station areas*	*Dispersed, evenly distributed*
Street networks	*Permeable for easy access; enables good level of service for pedestrians*	*Permeable for pedestrians, networks to reach transit stops corridors enable good levels of transit service*	*Permeability less important, enables high levels of service for cars on freeways, arterials and local roads. Bus circulation often restricted by cul-de-sac road structure.*
Block scale	*Short blocks*	*Medium blocks*	*Large blocks*
Potential level of access	*Equally distributed among pedestrians*	*Decreases with the distance from stations*	*High for those with cars low for other groups, especially those with a dispersed activity pattern*
Modal share	*Dominated (> 80%) by walking trips*	*Dominated by public transport and walking trips*	*Dominated (> 80%) by automobile trips*

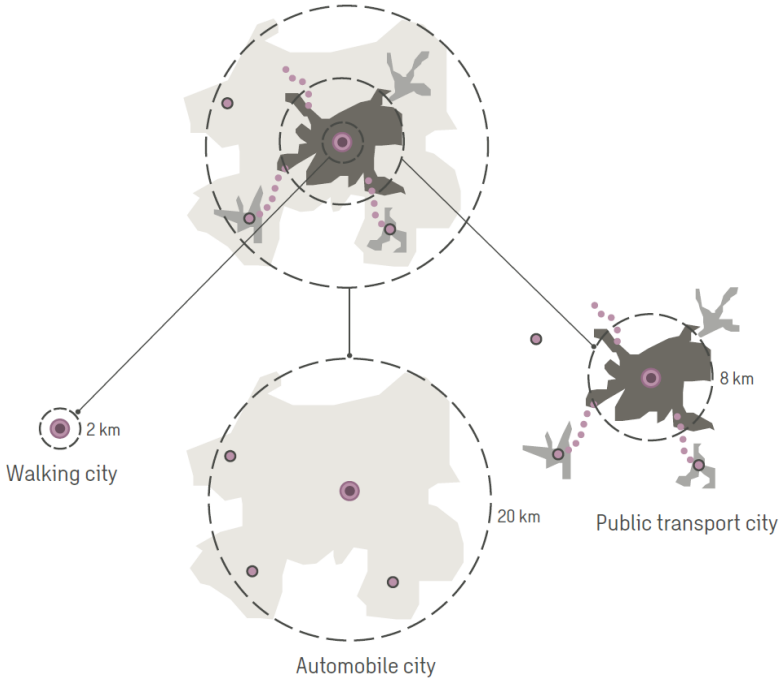

Figure 1: Walking, public transport and automobile city, a combination of three overlapping city systems. Source: Kosonen, 2007; 2013, through Lindelöw, 2018

3. THE 21ST CENTURY TRENDS AND NEW TECHNOLOGIES IN URBAN TRANSPORTATION

Are people able to predict how technologies will develop and how will future transportation change our cities? Science fiction literature and movies show cities full with flying and autonomous vehicles and some people claim this might be the urban future. On the other hand, many professionals find flying cars not playing a great role in this evolution for many years to come. But with technologies changing before you know it is sure that urban mobility will be revolutionized to a greater extent. Nowadays we experience the technological change in two vital elements of the urban transportation system – the infrastructure and the means of transportation.

Next generation urban transport systems will connect transportation modes, services, and technologies together in innovative new ways to help people find solutions for yet seemingly unsolvable problem. These changes are promoting new modes of transport, from next-generation autonomous, connected vehicles under development, to an array of new car, bike or micromobility sharing or on-demand services. Advanced technology developments, like smart infrastructure, connected and autonomous vehicles, faster wireless communications, and greater data sharing, offer unprecedented opportunities to create smarter, safer, less congested and more efficient communities. New technologies are already helping people on issues of safety, emissions, congestion, and traffic delays. The true impact of innovations will become visible when Information Technology (IT) and Operational Technology (OT) converge to define the true emergence of the Internet of Things (IoT) era in mobility. New and improved mobility services are making transportation ever more multimodal, on-demand, and shared, increasing consumer choice and convenience (Table 2)

Table 2: The present and future of urban mobility. Adapted from Bouton et al, 2015

FROM…..	***TO…..***
Individual car ownership, as predominant mean of transportation	*Car ownership, as form of multimodal, on-demand, shared transport*
Limited consumer choice and few service levels	*More consumer choice and many service levels*
Government funded public transit	*Public and private transit operate in parallel*
Unconnected, poor transportation systems	*On – demand, connected systems using data to unleash efficiencies*

The way we move in cities is changing, and the streets that support our movements must evolve. (Preciado, C., 2018). The way we use the streets will continue to morph as more people take to new mobility options. Shared multimodality will highlight the need to reevaluate how space is allocated along the right of way. Humans adjust their daily life very quickly to urban changes and new technologies but there is a definite period of adoption. With the arrival of connected and automated vehicles, there will be a period of transition as human and "robot" drivers must co-exist while older technologies either become obsolete or regulated out of existence. Such a transition period is expected to show the world the possible problems of such coexistence. One of them have been demonstrated by the Google self-driving vehicle experiment: the majority of the traffic incidents involving their test vehicles have involved a human driver running into these cars. Creating networks where these vehicles can drive within a dedicated lane will help raise visibility but also offer a platform for testing this technology in an urban setting. It will create visibility for these new vehicles and technologies while also creating a limited buffer from human drivers. This network should be an extension of a shared mobility network, rather than a completely separate network. Yet it will be valuable this new street network to be planned and designed today for faster implementation in near future. Like dedicated public transport and transit lanes, future urban streets should have designated rights-of-way for shared mobility during peak hours to help encourage more people to share rides to bypass congestion. As these networks are tested, it is possible they could be expanded from a single lane to multiple lanes or even entire roadways to help move more people more efficiently. By establishing a network or path of travel for these automated vehicles, cities can focus their investments in digital infrastructure improvements to support connected vehicle capabilities.

Technology makes it possible to relay critical real time information from our infrastructure to vehicles, smartphones and other receivers to make our public right-of-way safer, smarter and more efficient. Sensors at crosswalks can detect waiting pedestrians and automatically change signals; buses can sense bicyclists and pedestrians in blind spots and stop the vehicle to avoid a collision; streetlights and traffic signals can be programmed to detect when a vehicle is rapidly approaching an intersection and hold a change of lights to

avoid a crash. The new technologies are giving us real-time information on transit service, on-demand cars and optimal route selection. All over the cities telecommunications infrastructure is placed to provide people with faster connections to emerging technologies. Smartphones, GPS devices and digital ticketing are driving an increase in the collection of data about the attitudes and preferences of people regarding their everyday travel. These data can be used to improve the way transport networks are planned. Furthermore, real-time analysis gives access to time sensitive information, allowing decisions to be taken in real time. The increasing use of automation is important and will be an important part of todays and future urban transport development processes. Fully autonomous vehicles in common traffic may be still far away in the future due to many technological, market and policy constraints. However, increased communication among vehicles and increased levels of autonomy in human-driven vehicles is in the near future.

Technology is not a cure-all solution to mobility challenges. But it offers the chance to fundamentally redesign our street system with narrower, safer streets that still get people where they need to go. Technologies including smartphones, GPS devices and digital ticketing are driving an increase in the collection of data about how, why and where people travel. Sensor technology can also gather data and is becoming small and cheap enough to embed in infrastructure. Sensors in roads can improve traffic management and report on the condition of infrastructure, making maintenance quicker, less disruptive and cheaper.

4. CONCLUSIONS

The contemporary urban transportation is changing in fast manner. Vehicles take on greater importance in the present-day urbanized world. Hence, the attention of urban authorities is focused on them, and a lot is done to streamline their travel patterns. Traffic delays in rush hours have long been a global urban problem that forces urban residents to switch to bicycles, to walk or to rely on electric cars or buses. When automobiles were introduced widely entirely new systems of regulation, infrastructure and supportive services and industries had to be created and these changes occurred very quickly. In the past century, cities have made great advances in transportation but putting private cars on the top of the daily agenda have sacrificed city livability and lives.

With the increased demand on mobility urban transportation system is under great amount of pressure. Nowadays, transportation in many settlements and suburban areas requires owning a car. For many there is no other option for reaching given destination and many consider other transportation insufficient. But with the rise on new technologies the status quo is changing - from apps that make it easy for car owners to rent their vehicle to e-hailing and ride-sharing services. The availability and integration of increasing types and amounts of data will substantially increase the share of trips that are multimodal. A typical day might see an individual take a bus or train to get to and from work, rent a shared car to run errands, hop on a bike to visit a friend, and even combine different modes of transportation in a single trip. The operative concepts in this scenario are availability of options and ease of use.

The advent of the smartphone, access to the Internet and the spread of apps will continue to radically reshape our urban transportation systems by increasing system efficiency, better connecting and expanding first - last mile options, thus providing more choices to residents than ever before. The accelerated advancement of connected and automated vehicle technologies in the last few years will continue to challenge how we think about our public right-of-way, safety and an entire market sector built around traditional car ownership. Technology is leading cities to more dynamic transportation systems where people shift seamlessly between multiple modes depending on their needs.

So, it is expected that urban transportation will be more on-demand, with more sharing, and will provide a broader spectrum of services. Urban mobility will likely be lower cost, faster, and safer, and the lines between private and public transport will be increasingly blurred. Still we must consider that the rate of these technological changes far outpaces the available physical infrastructure and built environment. In order of the successful implementation of innovations in urban transport system a proactive approach towards transport policy, legislation and infrastructure planning is required. Reshaping the street network and providing the possibilities for implementation of new technologies will require additional time and financial resources. So national and local governments must accelerate their role in planning for the impacts and benefits of shared mobility, automated vehicles and other future transportation technologies so to meet policy objectives and create truly great streets and cities for all.

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SHIFTING FROM SUSTAINABLE TOWARDS REGENERATIVE DESIGN AND DEVELOPMENT IN CREATING URBAN ENVIRONMENTS

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ABSTRACT

Accelerated globalization has led to the development of urban settings that do not really interact with their environment or users. It is becoming obvious that the built environment has an increasing responsibility for global environmental and socio-ecological problems, for climate change, and that we must essentially rethink the way that the built environment is created. Designers are focused on aesthetics, function, required levels of comfort, and cost efficiencies, with minimal consideration given to whether developments synchronize with human life. It is also becoming clear that new construction and renovations need to go beyond reducing environmental impact, they must shift to a state of having positive environmental benefits. With sustainable approach designers are trying to limit the impact, to establish a balance point where we give back as much as we take, but moving towards the regenerative approach there is the intention to maintain a healthy state for social and ecological systems that can evolve. The regenerative design approach is gaining prominence because its purpose is to configure a system that seeks to reverse environmental degradation by creating positive impacts, rather than merely causing less damage, to increase the health and wellbeing of humans, other living beings, and ecosystems as a whole.

Keywords: *regenerative approach; regenerative design; urban environment; human wellbeing; environment; positive environmental impact*

1. INTRODUCTION

Brundtland originally defined sustainable development in general as not doing anything today to compromise tomorrow's generation. This passive 'do something positive but actually do nothing' approach, is taken by many practices as an excuse to do the least possible, and we are continuously compromising future generations because of our own needs. The built environment is a huge influencer on sustainability [2, 18]. Practices that use sustainable or green design are mainly focused on minimizing damage to the environment and human health and on using resources more efficiently. Their primary goal is to slow down the degradation of nature and the environment [10]. The built environment and the manner in which it is designed, constructed, and maintained has been a significant contributor to the climate breakdown today [2]. This means that a new urban agenda must be taken into consideration - overcoming the ambiguous idea of sustainability toward evolutionary regenerative urban development with the objective to improve the currently degraded condition of our ecosystems that we rely on is the solution [18]. The regenerative approach is a deeply integrated, whole systems approach to the design and construction of buildings and developments. Regenerative design can be defined as a system of technologies and strategies, based on an understanding of the inner working of ecosystems, that cause designs to regenerate rather than consume underlying life support systems and resources within socio-ecological wholes.

By the American Heritage Dictionary of the English Language, the word Regenerate can be defined as:

- To give new life or energy to; revitalize; to bring or come into renewed existence; to impart new and more vigorous life;
- To form, construct, or create anew, especially in an improved state; to restore to a better, higher or more worthy state; refreshed or renewed;
- To reform spiritually or morally; to improve moral condition; to invest with a new and higher spiritual nature;
- To improve a place or system, especially by making it more active or successful [10].

The regenerative approach aims to shape and form a system that attempts to reverse environmental degradation by creating positive impacts, rather than merely causing less damage, to increase the health and wellbeing of humans, other living beings, and ecosystems as a co-evolutionary whole. Moreover, regenerative development is an approach that enables human communities to co-evolve with natural living systems and building the field of caring for ongoing self-renewing.

Practicing green and sustainable design, practitioners have become engaged in thinking about how their work impacts the planet. Although these practices of the green design show many improvements in conventional design, they do conserve resources and reduce the damage to the environment and humans, but this is actually just slowing down the degradation of the earth's natural systems and resources. As was mentioned before, with the regenerative design and development there is a goal to reverse this degradation and negative environmental impacts instead of only slowing them down. Regenerative urban development seeks to mimic the circular metabolic systems found in nature [18]. Practitioners need to think about the interconnection of the human and nature to create living systems that are mutually beneficial and co-evolving. Regenerative design is not only about architecture, it is about people [1]. People need a healthy urban environment, the one that can be socially just, culturally rich, economically sustainable, ecologically sound, and net-positive.

2. THE DIFFERENCE BETWEEN TERMS GREEN, SUSTAINABLE, AND REGENERATIVE

The terms green, sustainable, and regenerative are very common in the architectural world. According to Cole, the dominant paradigms shape design priorities, and environmental priorities in the design are influenced by the types of tools and methods used in practice [3]. It is necessary to clarify the distinction between these terms and approaches to understand how they differ and what kind of tools and methods are involved (Fig. 1).

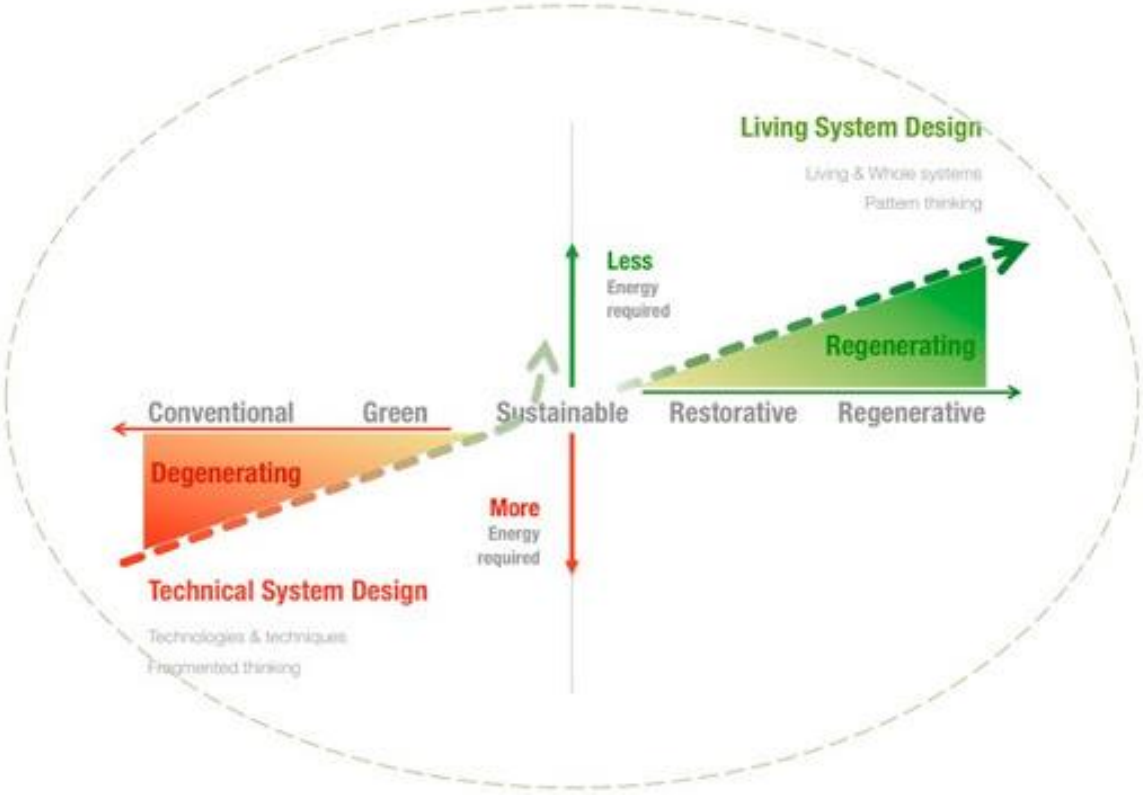

Figure 1: From conventional towards the regenerative design [10]

2.1. Green design

The green design accents the environmental performance of buildings. We can say that a building is green if it has a higher environmental performance than a standard one. The term eco-efficiency is in direct correlation with green approaches. Green design is primarily about resource use, emission/waste, health, and comfort. Through green designing practitioners, strive to reduce the degenerative consequences of human activity on ecological systems and improve the health and comfort of occupants [3]. It can be found in many scholars that by designing 'green' we are 'doing less harm' for the environment [4, 11, 15]. Reed defines green design as 'a general term implying a direction of improvement in design, i.e. continual improvement towards a generalized ideal of doing no harm' [15]. According to Cole, the following are the key attributes of green buildings. These attributes can be translated into urban developments, too. Green buildings:

- Reduce damage to natural sites and the need for new infrastructure;
- Reduce the impact on natural features and site ecology during the construction;
- Reduce the potential environmental damage from emissions and outflows;
- Reduce the contributions to the global environmental damage;
- Reduce the usage of resources, such as energy, water, and materials;
- Minimizes the discomfort of occupants, harmful substances, and irritants within [4].

2.2. Sustainable design

As stated before, in 1987, the Bruntland Commission explained sustainable development as 'meeting the needs of the present without compromising the ability of future generations to meet their needs.' According to David Orr, sustainability falls into two streams: technological and ecological sustainability [13]. While technological sustainability focuses on technical and engineering-based solutions, ecological sustainability emphasizes an understanding of ecology and living systems principles. Green or eco-efficient design, emerged as a result of the first stream [10] while regenerative design and development, and some other approaches like biophilia and biomimicry, came from the ecological sustainability stream.

Scholars generally present 'sustainable design' as a medium stage between green and regenerative, a 'neutral' state that provides the necessary base condition that permits regenerative capabilities to evolve [4, 11, 14]. Cole points out that this positioning of sustainability applies only to what Orr describes as 'technological sustainability' and, therefore, relate to green building practices and other strategies to manage progress [4]. In the literature, the triple bottom line of sustainability is defined by three factors: ecology, social, and economy. In the figure 2, there is first the Venn diagram that expresses the triple bottom line with three intersecting circles. Second, the nested dependencies model uses overlaid circles sharing a common center, one inside the other. According to the nested model, ecosystems sustain societies that create economies [1, 5].

Figure 2: The three pillars of sustainability displayed by Venn and the nested diagram [1]

A number of ecological strategies for sustainability were developed during the 1980s and 1990s and they were organized around the core set of philosophical, theoretical, and scientific concepts that underlie the ecological perspective of reality. All were committed to net-positive goals for the built environment, and to integrating

human structures, processes, and infrastructures with natural living systems. They differed in the systemic scope they enfolded (Fig. 3) [10].

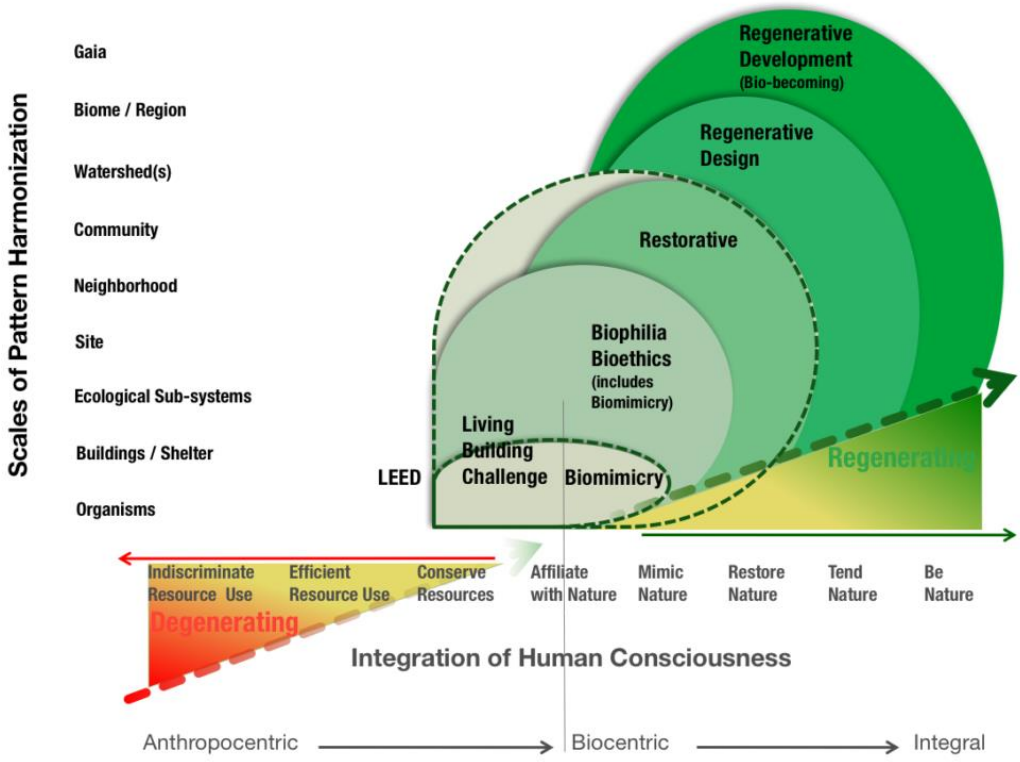

Figure 3: Levels of ecological strategies towards sustainability [10]

2.3. Regenerative design

In the Encyclopedia of Sustainability Science & Technology, Mang and Reed define 'regenerative design' as 'a system of technologies and strategies, based on an understanding of the inner working of ecosystems that generates designs to regenerate rather than deplete underlying life support systems and resources within socio-ecological wholes' [4]. Additionally, they define 'regenerative development' as "a system of technologies and strategies for generating the patterned whole system understanding of a place and developing the strategic systemic thinking capacities, and the stakeholder engagement/commitment required to ensure the regenerative design processes to achieve maximum systemic leverage and support, that is self-organizing and self-evolving" [1].

Together, regenerative development and design provide a framework for creating, applying, adapting, and integrating a blend of modern and past technologies to the design of sustainable built environments, achieving positive ecological and social outcomes that include:

- Improving the health and vitality of people and communities - physical, psychological, economic and ecological;
- Producing and reinvesting surplus resources and energy to build the capacities needed for resilience and continuing evolution of communities;
- Creating a field of caring, commitment, and deep connection to a place that enables the changes required for the above to take place and to endure and evolve in time [7, 9].

Regenerative development and design identify that "humans, human developments, social structures, and cultural concerns are an inherent part of ecosystems", making humans integral and essential participants in the health and fate of the earth's natural systems. Based on this perspective, the sustainability of the built development industry is largely determined by whether humans act as partners or as exploiters of natural systems [9, 10].

According to Du Plessis, three highlights explain the basis of regenerative approaches. What is important:

- Understanding how nature works instead of how humans would like it to work;
- Seeing the world as ever-changing, impermanent, and inherently unpredictable;
- Accepting that humans and nature are not two separate interacting systems [1,6].

3. BENEFITS FROM REGENERATIVE URBAN DEVELOPMENT

Cities that source a greater amount share of the resources they consume from their local territory create social, economic, and environmental value in their communities. Regenerative cities:

- Improve the environment and natural ecosystems;
- Drive the local economy;
- Improve neighbourhood cohesion and health;
- Increase their own resilience; and
- Enhance participatory decision making [18].

3.1. Environmental benefits

As stated before, the core of the regenerative vision is ensuring that future generations inherit a robust world and that cities continue to provide opportunities for all humans to have the best quality of life. Despite the challenges of degraded land, rising sea levels, and polluted air and water, cities can still progress towards this vision by regenerating the resources they consume and strengthening the health of the ecosystems they depend on. Regenerative cities should imitate the circular metabolic systems found in nature, and that means aiming for a 100% renewable energy in all fields. Regenerative cities reduce their consumption of fossil fuels and energy imports so there are smaller greenhouse gas emissions. This results in slowing down climate change and improving cities' air quality. The transition to renewable energy also decentralizes energy production points. Cities that mostly use local resources, reduce energy use by shortening the distance for transport. Urban and peri-urban agriculture as a primary source of food for the urban population also results in increased efficiency in water and nutrient use as well as a smaller energy demand through a smaller need for food storage and packaging. Regenerating raw materials such as wood by replanting trees has many benefits: the wood is always available, it is good for the ecosystem, soil fertility is better, soil erosion is prevented, forests absorb carbon dioxide. This closing of resource loops to enable a circular urban metabolism was identified as the first step of regenerative urban development. To close the water loop, cities need to recycle and reuse, capture nutrients in wastewater, and treat the remaining wastewater before discharging it into rivers or coastal waters. This helps to prevent rivers from drying up or becoming contaminated and reduces the amount of warmed water from the industry from being dumped into river courses, which would impact the habitat conditions for fish and other river life. Soil fertility benefits from regenerative urban development through soil application of the organic nutrients extracted from wastewater and waste as fertilizer [18].

3.2. Economic benefits

Regenerative cities produce local and that means that a city creates jobs for local residents. This withdraws that employees spend their incomes on the local level, which allows tax revenue to remain in the area and keeps economic wealth circulating locally. Regenerative urban development usually results in more socially equitable cities and increased economic prosperity. Around the world, local renewable energy resources lead to socio-economic development through new local jobs, tax revenues, and lower energy prices. In Germany transition towards renewable energies like solar and wind, mostly decentralized and community-based created 370,000 new jobs in the country from 2000 to 2010. Regenerative urban development is easier to implement if urban resource consumption is low. Regenerative development attracts the businesses that can see the long-term vitality of the city as lower-risk. If the city is vital it can be more capable of resisting external shocks, and thus reflective of long-term prosperity for the businesses themselves [18].

3.3. Social benefits

Closing the resource loop on a community level can help create social bonds and enhance cultural value within the city. Urban agriculture has proven to improve social cohesion and lower crime rates by enabling local residents to own their community and daily lives. This is especially applicable to poor and marginalised neighbourhoods. People connect with their neighbours by working on a project together. Community farms in Philadelphia and Chicago, for example, provide employment for residents with past criminal records who have

trouble finding work elsewhere, and in this way, they can integrate back into society [18]. As for the regenerative food system, a direct benefit of it is that the urban population has much better access to nutritious food. Another direct benefit of regenerative urban development is that there is no waste so the environment in the city is more liveable and healthier.

3.4. Resilience benefits

From natural disasters to broken water mains, cities must be able to address many issues at once. More than being prepared, cities must also be proactive in order to generate real, meaningful, and positive progress. The role of big, open data is imperative for the resilient city as it represents a wealth of information that can be leveraged to improve communications, foster innovation, generate economic activity, and enhance livability. An informed decision-making process is critical to maximizing a city's impact with increasingly constrained resources [17]. Regenerative development reconnects cities with the production systems they depend on by fostering urban-rural linkages. Increased self-sufficiency allows a city to be more resilient to external influences, including instability of resource price and availability. By fostering local production, regenerative urban development reduces the city's dependence on imports of food and other resources. Shorter supply chains provide a safety net to support cities [18].

4. CASE STUDY: SAN FRANCISCO

The City of San Francisco set a goal to have a 100% renewable electricity supply community-wide by 2030. In 2010 the mayor of San Francisco announced a 100% renewable electricity target to be achieved in the next ten years. The goal was first established in a 2008 City Ordinance outlining San Francisco's climate targets. The target, building on the 51% Renewable Portfolio Standard set in 2007 for 2017, can be seen as one instrument to fulfill the Climate Change Goals Ordinance, which set high greenhouse gas reduction targets. While the ordinance only establishes greenhouse gas-free electricity production by 2030, the 100% goal goes one step further. A Mayoral Task Force, headed by the San Francisco Environment Department and comprised of local renewable energy leaders, key stakeholders, representatives from environmental NGOs, and other City departments, was set up to create strategies on how to reach the 100% renewable power by 2020. By this approach decision making was more collective and that helped to raise public support for the project as well as involved the necessary technical expertise. The task force identified five strategies for the city to become 100% renewable, based on a feasibility study:

- Increase energy efficiency (by promoting energy audits and retrofits, integrating green building, tightening building code energy requirements, etc.);
- Encourage local renewable energy production (Fig. 4), which improves energy security and strengthens the local economy;
- Provide 100% renewable power purchasing options;
- Expand access to local renewables and local renewable energy (to support local economic development);
- Encourage private sector investment in renewable energy.

To have a successful implementation, the task force proposed a local feed-in-tariff, the adoption of a rooftop solar policy, net metering, and an up-to-date planning and permitting process. The task force focused attention on policies for rooftop solar installations on newly constructed and renovated buildings as well as solar water heating because the city already has a very high solar potential [18].

Figure 4: Solar panels in San Francisco, source: https://cleanpowerexchange.org/

Up till now, San Francisco achieved the Kyoto Protocol target of reducing greenhouse gas emissions to 7% below 1990 levels; the city reduced municipal, commercial, and residential energy use in San Francisco by 45 MW; more than 18.5 MW of in-City renewables had been installed, with 15 MW of solar PV (more than 2,000 systems) citywide and 3.5 MW of biogas cogeneration at the City's wastewater treatment plants; all public transportation in San Francisco is running on electricity or biodiesel; potentially large quantities of urban wind and offshore wind energy capacity are yet-to-be explored, etc [16].

These developments were made possible by an active and involved mayor, engaged stakeholders, and support from an enabling policy environment on the state level: 12 in 2002 Community Choice Aggregation program in San Francisco was created and it allows local authorities to aggregate the buying power of individual customers in their constituencies in pursuing renewable energy supplies. San Francisco's goal to reach 100% renewable energy shows how regional conditions can be changed to use the full potential of renewable energies. It is becoming a regenerative city by focusing on local production of renewable electricity, thus decreasing its dependence on fuel and electricity imports as well as private utilities, which allows the city more control in accomplishing its 100% target [18].

5. CONCLUSION

Despite the multiple benefits outlined, there are some obstacles interfering with progress on regenerative urban development. The main challenges arise from institutionalized failures in our political, financial, and societal structures, requiring leadership and political commitment to overcome them. The following are some of these barriers: short-term visions, silo approaches, lack of policy mandate, and financing and corruption [18].

The regenerative design focuses on health and designs that are socially and culturally 'just'. Designs for indoor and outdoor environments must demonstrably improve inhabitant health, and not merely seek to reduce ill-health. The interconnection between human health and the planet's health can be used as a driving motive for regenerative design. This implies an in-depth knowledge and understanding of how the health of the planetary ecosystem connects with the health and wellbeing of people [12]. A guideline for regenerative environments could be summarized in this way: from reducing to reversing (environmental damage), from reducing to contributing (to regeneration), from reducing (waste) to creating (circular growth), from minimizing to salutogenic (wellbeing), from minimizing to using solely (healthy materials) [8].

Successful implementation of a new urban paradigm could be helped by: leadership, a strong vision, and political will; inclusive policymaking: public participation and involvement of diverse stakeholders; integrated governance: decentralized decision making coupled with vertical coordination; a holistic policy approach: a cross-sectoral approach that facilitates horizontal dialogue; good governance: enforcement and accountability; and enhanced dialogue: effective communication and education. With these tools, regenerative cities can lead the way not only in securing long-term prosperity for their citizens but also positively enhancing the health of their environment and the vitality of the planet [18].

The question can be asked: is a Regenerative City a utopian idea? It definitely is. It provides a vision for all municipalities and communities to aspire to [17]. While there are no examples of a fully regenerative city,

many cities around the world demonstrate regenerative urban development in certain sectors and embody many of its elements. The built environment no longer has the luxury of just being 'less bad', but, with urgency, needs to adopt net-positive, regenerative sustainability thinking to incrementally do 'more good'.

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APPLICABILITY OF POP-UP APPROACH TO FLOATING URBANISM: DEMOCRATISATION OF AQUATORIUMS IN THE CITY OF BELGRADE

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ABSTRACT

In the area of the city of Belgrade, HoReCa facilities (Hotel/Restaurant/Café), vessels that serve the needs of marinas and sports clubs are the only legally recognized functions of facilities assigned to an area of water and river shore to place a vessel for a minimum of 10 years of use. In the central zone (A), within which it is only possible to place a vessel, in addition to the listed facilities, activities in the field of HoReCa, culture, and tourism can be performed, but only as additional activities of a smaller scope. Such (un)planned strategy gives water tenants full coastal autonomy that relies exclusively on economic benefit. Seen through the prism of fundamental sustainability factors: economic, social, and environmental, the essential natural resource becomes a sluggish and undemocratic urban structure in a fluid environment and a mobile, "fluid" society. The complexity of understanding the relationship between private and public good, the dual nature of ownership: formal and informal, finds its expression in various forms of tactile (pop-up, guerrilla, DIY) culture. In architecture and urbanism, these are low-cost, mobile structures and projects implemented by the community within the public space, thus supporting social equality. This paper aims to examine the relationship and possible correspondence of pop-up urbanism within the aquatic environment and floating structures in Belgrade.

Keywords: *Pop-up urbanism; Floating architecture; Belgrade waterfront; Mobility; Democratization*

1. INTRODUCTION

Public spaces are a public good, places owned by citizens, pleasant and equally accessible to all, free and without a profit-making policy (UN Habitat, 2018). Although they can be leased, water and water land are primarily a natural resource of the Republic of Serbia, i.e., public water good in public ownership. It is inalienable and must be used in a way that does not adversely affect water, the coastal ecosystem, and does not restrict others' rights[1]. The existing law on floating structures is not implemented in practice (in technical, safety, contextual, or aesthetic terms). The lack of legal and planning elaboration limits the possibility of significant urban interventions. It further allows the owners of floating objects to complete autonomy over the waters of the most attractive locations in the city, which results in problems with noise, contamination of the water area around the rafts, frequent fires and accidents on buildings, sewage spills into the river, etc. Besides, objects of non-standardized design and aesthetics, due to the short distance between them, form, like a street front, a visual barrier between the shore and the river, and create a "first private-then public" relationship.

[1] Službeni glasnik Republike Srbije: *''Zakon o vodama republike Srbije''/ "Law on Waters of the Republic of Serbia"*

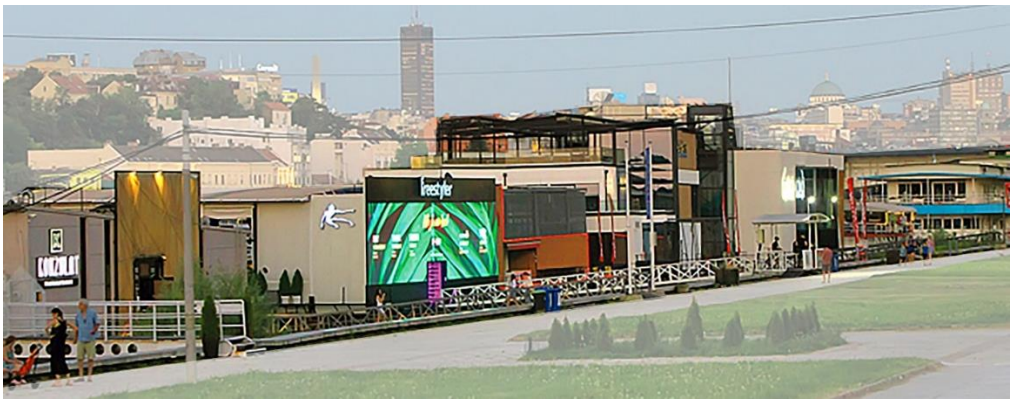

Figure 1*: Blocked view from the land on to the river Sava, directly across Kalemegdan fortress*[2]

In this context, the democratization of aquatoriums means creating a space on the water which, in addition to physical accessibility, in terms of content, design, and sustainability, would continuously provide the same quality experience of living and recreation to all categories of users. It is a space with which users can identify and achieve a "first public-then private" relationship. Given that people's needs are prone to increasingly dynamic changes, the aquatic environment, which is itself changeable, is conditioned to change further, develop, and transform by users' needs in space. In practice, such "temporary" interventions find their specific expression and are defined by the term tactile (pop-up, guerilla, DIY) architecture.

Changing the approach to floating architecture would mean that from a series of sluggish and content-unified structures of the water area, it would become a changeable, mobile, and fluid environment (guerilla urbanism). Conscientious planning in the interest of citizens and future generations would provide an opportunity to create and democratize public spaces that could fully illustrate the concept of *"Belgrade on the water".*

2. BASELINE CONSIDERATIONS

The Belgrade' aquatorium is divided into three zones depending on the conditionality degree into:

- Zones in which it is possible to place vessels (A)
- Prohibition zones (B)
- Conditional Prohibition Zones (C)

It is allowed in zone A to place exclusively floating facilities with catering services in the central area. Catering includes accommodation facilities (hotels, hostels, etc.) and restaurants (bars, clubs, fast food, cafes) with a prescribed minimum distance of 15m between facilities. The law also gives applicants for a water place the right to simultaneously lease five water plots, i.e., 150m of coastline in the central city area for a period of 10 years of use.[3]

[2] *Photo: Marko Spasojevic, http://www.politika.rs/sr/clanak/459511/Bez-zurki-i-slavlja-na-vodi#!*
[3] Službeni list grada Beograda: *''Plan mesta za postavljanje plovila na delu obale i vodnog prostora na teritoriji grada Beograda''*

Figure 2*: Overview of the current situation on the river banks in the area of Novi Beograd. Indicated distances show existing objects and spaces between them*[4]

As a reference model, in this case, we can use the Bureau Veritas classification[5]. In 2012, Bureau Veritas issued a particular classification rulebook intended exclusively for floating architecture. The rules apply to floating buildings, i.e., moored or anchored vessels without navigation that have any public/catering purposes and are located in water areas. It, grouped according to the function of the floating unit, recognizes a much larger number of categories: cinemas, theaters, meeting rooms, shops, dance halls, playrooms, libraries, documentation centers, exhibition spaces, hospitals, clinics, worship and administration, office spaces, museum activities, etc.(Bureau Veritas, 2012)

Diversity of functions can positively impact space branding and open space for social inclusion and creative dialogue. However, what is essential to consider is that the facility's purpose at a particular location should not be decided by the tenant but by the Institute of Urbanism following the General Urban Plan, which includes the water area as a separate natural entity. Otherwise, the floating architecture without a plan and regulation is equal to the definition of kitsch: low-value design and the goal of accessibility to a wider circle of people - usually favors the underdeveloped tastes and particular needs of people who are on the verge of value and moral acceptability (Vidanović, 2006).

2.3. Noise pollution

The perception of the Belgrade as a "city on the water" and a tourist epicenter of "turbulent" nightlife and excellent and cheap food is not a perception of the present moment alone. According to Jelavic, even in academic discourse, Belgrade, Serbia, and the Balkans are stereotypically represented by emphasizing their inhabitants' hedonism. This hedonism is attributed to resistance to modernization and the tradition of an uncertain tomorrow. Nightlife on floating clubs is undoubtedly a Belgrades' brand and a representative of the dominant (sub)culture with a decade-long tradition.

On the other side, citizens who live or stay near water clubs, due to noise and communal disorder created in nightclubs that work longer than midnight, lose the right to privacy and peace. To solve this problem, in 2011, a study was conducted 'Analysis of the possibility of reducing noise from rafts on the Sava by setting up a cushion barrier.' The acoustic barrier, considered a possible permanent and successful solution to the noise problem, was an expensive, complicated, and utterly ineffective method. In practice, this means that buildings must be reconstructed to achieve a sufficient level of sound insulation. It was concluded that a significant reduction of building noise could be achieved only by combining three methods:

- control of sound level at the output of the disco sound system
- upgrading the building on the raft with solid walls and roof, and finally
- setting acoustic barriers, as a last resort (Mašović et al., 2011)

[4] Photo: Civik Initiative ''Za naš Kej''
[5] BV operates in 140 countries, with a tradition of 190 years. Bureau Veritas 'mission is to reduce risk, improve our clients' performance and help them innovate to meet society's demands with confidence.

The brand of *"the city of entertainment"* does not necessarily imply a polarization between profit and devastation. By applying the optimal design, planned selection of the water plot, and the grouping of facilities, a sustainable, profitable, and attractive water space organization can be created.

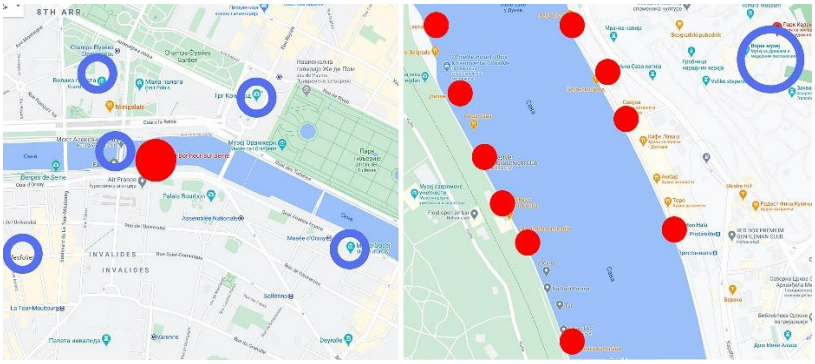

Figure 3: Comparison of the Seine in Paris (left) and the Sava in Belgrade (right): illustration of the relationship between nightclubs on the river (red dots) and cultural and historical assets in the central city area (blue rings)

Examples of floating restaurant-bars / nightclubs in Paris are *Rose de Bonheur sur Seine*[6] and *Le Flow*[7], whose central location provides access to a prestigious setting. Floating by the Alexandre III bridge, the buildings have a dialogue with prominent historical sites, representatives of the Parisian identity: the Eiffel Tower, the Grand Palais, and the place de la Concorde. The condition is that the facilities must be completely soundproof. The use of quality facade glass reduces the noise to the legal level. The facilities are transparent and visually integrated into the context of the environment.

(a) (b)

Figure 4: (a) Rose de Bonheur sur Seine and Le Flow[8] and Grand Palais (b) Rose de Bonheur sur Seine and Le Flow[9] and Eiffel Tower

3. THE POP-UP

The aquatic environment itself is a specific Pop-up context: it is changeable, volatile, and equally responsive to change as it induces it. Rivers, together with objects that float on them or float anchored, form a significant urban (sub)unit.

Objects or pop-up interventions in space are characterized by the variability of function and location[10], integrated into the existing, "permanent" urban fabric while retaining recognizability and local identity. The pop-up environment allows users to transcend the model of 'durability and immutability'. It provides a solution to specific, current needs for a particular function, subject to continuous modifications, and adaptations. In this way, destructive interventions within a permanent environment are prevented. Instead, the new structures are

[6] Rosa Bonheur Sur Seine | La Guinguette Au Bord de l'eau'. Accessed 29 September 2020. https://www.rosabonheur.fr/rosa-seine.
[7] Flow Paris. 'Flow Paris, Bar et Restaurant Sur Les Quais, Rooftop et Club.' Accessed 29 September 2020. http://www.flow-paris.com/.
[8] Photo: https://www.rosabonheur.fr/
[9] Photo courtesy of Sergio Garsia: https://archello.com/story/74435/attachments/photos-videos/2
[10] An example of this is the Good Hotel, a former floating prison building used to house immigrants in the Netherlands, reconstructed, prevented, and anchored in London as a luxury hotel on the water.

integrated into the existing matrix and define the newly created models of use and functions, leaving the task of maintaining memory and identity to traditional architecture (Bertino et al., 2019).

Such a model of observing architecture on water would reflect respect for nature in its authenticity: changes in the microclimate concerning seasonal conditions, constant movement, rising and falling water levels, the variability of river biodiversity, cultural-historical and residential context, etc.

3.1. Spaces for expression

In pop-up urban interventions, property law acts in conjunction with a more informal "sense of ownership." Although different from legal ownership, a sense of ownership can provide many benefits sought from a property in its conventional sense: inclusion, community, power, and political voice (Thorpe, 2018). In the context of Belgrade's floating architecture, creating a counterweight to the tenant's "waters" requires spaces of free views and floating structures that would be free and accessible to all and leave enough space to create an individual experience (in the form of sunbathing areas and bathing parks; floating parks; pontoons available for hobby leads such as reading, writing, drawing; yoga and meditation; exhibition and performance, etc.). As floating objects' purposes can be different, their quality is reflected in the simplicity of the structure itself, from which multifunctionality arises. The concept of use is also an important factor that needs to be adapted to the community's needs while enriching the space regarding content and responsibility towards the environment. Objects in private ownership or organization do not necessarily have a negative connotation. Examples of this are the organization of floating theaters, museums, concerts, etc.

Although not a typical representative of floating architecture, the Ulysses Theater in Croatia has regional significance in promoting the concept of pop-up theater and represents a possible parallel to the Great War Island in Belgrade.[11] The fortress Minor on the island of Mali Brijuni has been converted into a summer stage with minimal interventions, and 'from then until today, the ambiance of the Fortress has remained an equal figure in all works of art performed on this imposing natural scene.'[12] At dusk, the spectators are transported by an excursion boat from Fažana on the mainland, when the show's experience begins. The play takes place under the open sky, removed from everyday life, and ends with the act of sailing back.

3.2. Spaces for creation

Pop-up cultures are manifested in various forms: designer shops, restaurants, accommodation (e.g., Airbnb), co-working space, etc. The goal is to create an unusual and memorable experience, the presentation of an idea or brand for marketing purposes, etc. An example of an innovative idea is a pop-up science shop.

Many people for whom traditional scientific institutions, places, and events do not give the impression of accessibility, hospitality, comfort, or reliability. On the other hand, pop-up science shops can provide a "non-threatening" and relaxed space for scientific engagement. Stores are a ubiquitous feature of most communities and cultures, whose rules and conventions are intuitively understood. At the same time, the guiding ideas of this concept represent the general goals of pop-up culture in the context of space:

- Reaching the audience in places where people already spend time;
- Build relationships with the community;
- Establish cooperation with the local population in creating the project;
- Experimenting with new engagement formats;
- Temporary testing of the idea;
- Do something different / unusual / unexpected / surprising;
- Initiate a dialogue;
- Address the current problem in an agile way;
- Deal with a challenging topic;
- Affirm courage, bravery, and risk (Dowell, 2017);

[11] The island of Mali Brijuni, like the Great War Island, is uninhabited and under state protection.
[12] Ulysses theatre, https://www.ulysses.hr/hr/o-nama/kazaliste-ulysses/ (accessed 9.15.20).

In the context of Belgrade, they would provide space for education, social activism, dialogue on ecology, etc., such as the 2016 Swale[13] project in New York.

3.3. Adaptable spaces

The dynamics of changes in different spheres (socio / economic, hydro-meteorological, political, etc.), local and global, are ultimately permeated and manifested in physical space. The intervals between extreme events are becoming shorter (floods, high levels of air pollution, pandemics, etc.), and the need for adaptability of public space over time is growing.

Examples are restrictions on public spaces and physical distancing as key policy measures to reduce COVID-19 transmission and protect public health. At a time of global lock-down, the importance of being in the natural environment and social contact is gaining visibility.

Recreational, sports, and cultural events can still be realized with alternatives, i.e., guerilla approach to space use. One of the pop-up urban concepts is the concept of "sail-in" open-air cinema. A successful example from practice is the Port Authority's initiative in Toronto to connect the coastal area with the local community. The idea found expression in double-sided screens on a floating pontoon for outdoor cinema, as the only which thereby is a mobile intervention in space. The concept allows users to watch movies from both land and water: on land, there is a place to stay and sit, and on the water, there is a berth for boats. Following the idea of democratizing the waterfront and making it affordable to everyone, The Sail-In Cinema event is free. The community chooses the movies, and the accompanying activities, food, and entertainment are organized by the event sponsors before the start of the screening each evening to create a program for all categories of users. According to the statistics from 2017., in 3 days, movies were watched by 11,000 people from the mainland, with additional hundreds of visitors from over 100 boats.[14]

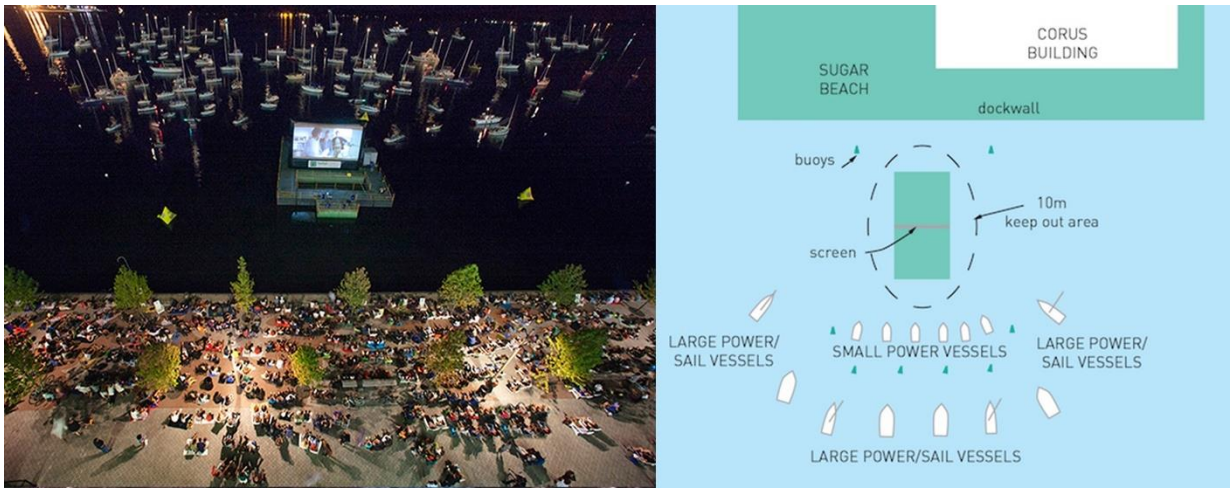

Figure 5*: Photo and illustration of the event: Sail-In Cinema in Toronto, 2017.*[14]

4. CONCLUSION

The lack of precise interpretation of laws and regulations leads to inconsistencies in implementation, resulting in coastal contamination and deviation of the public / private space relationship. Existing water laws, plans, and decisions on the installation of floating structures, although deficient, provide a reasonable basis for further formation of regulations and urban plans in the field of floating architecture. When we talk about facilities on the water, this does not mean the exclusive existence of catering facilities, restaurants, and rooms for rent. Today, the global world classification societies already recognize the presence and need for buildings of various purposes, from dormitories, libraries, museums, schools, etc.

[13] 'Swale is an experiential and co-educational edible landscape built on a hopper barge that utilizes marine common law in order to circumvent local public land laws. While working to shift policies that will increase the presence of edible perennial landscapes, Swale can strengthen stewardship of public waterways and land.' https://www.swalenyc.org/

[14] http://sailincinema.com/ (accessed 9.15.20).

Following that, Belgrade's nightlife can keep its authenticity and simultaneously improve the quality of the experience by reorganizing the water area facilities and adding new, changeable, and innovative content. To take into account, in addition to economic, social, and environmental factors, the applied model of change must be cost-effective, easily sustainable, and does not require additional infrastructure, and be available to all categories of users. One of the models is the pop-up (DIY, guerilla) approach: without permanent interventions in space and maximally open to creating unique experiences.

Rivers, together with objects that float or anchor on them, create a temporary, changeable environment prone to change of function and location. Mobility, which is the core of a pop-up, in the example of floating structures supports the seasonality of entertainment and tourism and allows the waters to get rid of excess facilities out of season and exist as a free space of open views and access to water. Content diversity leads to creative dialogue and social inclusion, and the application of optimal design, location, and grouping of objects creates a sustainable, profitable, and attractive space on the water. The idea is to reach the audience in places where people already spend time, build relationships with the community in creating the project, and experiment with new engagement formats.

From understanding property rights, community division should make such interventions create an informal sense of ownership that acts as a cohesive factor in bringing people together for a shared vision or goal. The implementation of the concept of pop-up builds a culture of adaptation, instability, movement, which is the key to successful development in the context of socio-economic, hydro-meteorological, political, and other changes at the local and global level. Thus, the culture of adaptation becomes one of the few self-sustaining models of urban planning, social organization, collaboration, and development in the years to come.

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POCKET PARKS AS A TYPE OF URBAN GREEN SPACE – BENEFITS AND POSSIBILITIES OF IMPLEMENTATION

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ABSTRACT

In recent years, several relevant ecologically-oriented urban development concepts have emerged in response to climate change, rapid urbanization and other challenges that shape today's urban reality. Urban green infrastructure (UGI) is recognized as one of the striking concept with an important role in the process of urban planning and design, as well as in urban regeneration. An integral part of UGI approach are urban green spaces (UGS), which are diverse and vary, from green walls and roofs, to community gardens, parks and river banks. Pocket parks are also one of the types of urban green space which are commonly applied in the process of urban planning, design and regeneration. They are usually defined as publicly accessible small park-like areas between and around buildings. Beside analyses of pocket parks basic characteristics, benefits and possibilities of their application, the research focus is on determining suitable locations for their application in the city of Nis.

Keywords: *urban green infrastructure; urban green space; pocket parks*

1. INTRODUCTION

In the last few decades, several ecologically-oriented urban development concepts have emerged as solutions for climate change and rapid urbanization adaptation, providing ecosystem services and to express the role of green infrastructure. One of the recently developed, which was noted in academic debates and is gradually referred more to in policy-making, is Urban Green Infrastructure (from here on, UGI). The UGI concept is firmly connected to urban planning and engrained in both landscape ecology and architecture (Fletcher et al., 2014). There are different definitions of this concept. It is understood as a strategic approach to develop "an interconnected network of green spaces that conserves natural ecosystem values and functions, and that provides associated benefits to human populations" (Benedict and McMahon, 2006). This approach can be decisive for achieving the 2020 biodiversity target at the Pan-European scale (SCU-UWE, 2012; EU, 2013). According to Millennium assessment report (2005) and the Green Surge project (2017), UGI is seen as a planning approach aimed at creating networks of multifunctional green spaces in urban environments (Vasilevska et al., 2019). Common to all definition is contribution to cities sustainable future by solving crucial urban challenges - climate change, biodiversity conservation, demographic changes, land use conflicts, a greener economy, human health. UGI should also maintain and promote ecosystem services and deliver multiple benefits for humans (Fletcher et al. 2014), while providing environmental, social and economic benefits and help building social resilience.

Urban green spaces (from here on, UGS), are seen as a crucial functional and physical urban form of UGI implementation in urban practice (Green Surge, 2015). UGI can provide strategic guidance for the integration of nature based solutions into developing multifunctional UGS networks at various scales (Pauleit et al, 2020). The benefits of UGS implementation are multiple in terms of: 1) providing recreation in everyday life, at different urban levels; 2) contribution to the conservation of biodiversity; 3) contribution to the cultural identity; 4) assisting in maintaining and improving the environmental quality; and 5) bringing natural solutions to technical problems, for example sewage treatment or stormwater treatment (Sandström, 2002; Vasilevska et al., 2019).

Increasing interest in UGS is also driven by several other factors such as: 1) widespread concern for the decline in the quality and condition of many parks and other urban green spaces due, in part, to their generally low priority in the political agenda at both national and local levels; 2) growing emphasis on the need for more intensive development in urban areas, focused around the Compact city concept as the model for future cities in Europe, raising questions about the role of green space in this model which is based on the densely populated and compact physical structure; 3) parallel emphasis on the development of brownfield rather than greenfield land, and a recognition that more intensive urban development may sometimes involve the sacrifice of existing areas of urban green space.

UGS, as part of the urban ecosystem, are diverse and vary, from green walls and roofs, to community gardens, parks and river banks. Swanwick et al. (2003), for instance, recognize 25 urban green spaces types, divided into 4 main groups: 1) amenity green space, 2) functional green space, 3) semi-natural habitats, 4) linear green space, and 10 subgroups, while Bell et al. (2007) as UGS types recognize parks and gardens, natural and semi-natural spaces, green corridors, allotments, community gardens and urban farms, outdoor sport facilities, amenity green spaces, provision for children and young people, cemeteries, and other public spaces, such as squares, pedestrian areas or cycling areas. Other typologies are based on usage (Hoffmann, 2014), dimensions of green spaces that are important for urban consolidation (Byrne, 2010), or cover informal urban green spaces (Rupprecht, 2014). Pocket parks are recognized as a common UGS type in most of them. The focus of this paper is on analysis of basic characteristics and benefits of these smallest type of park, as well as on determining suitable locations for their application in the city of Nis at the conceptual level.

2. METHODOLOGY

The methodological framework of this paper is based on an analytical approach which relies on methods of description, observation and analysis. Methods of description and analysis were applied in analysing the basic characteristics and possibilities of pocket parks application, and in exploring the conceptual framework of their integration into the process of urban planning and design. Methods of observation and analysis were included in exploring the suitable locations for possible implementation of pocket parks in the City of Nis.

3. POCKET PARKS – SETTING THE CONTEXT

Pocket parks are defined as publicly accessible small park-like areas around and between buildings vegetated by ornamental trees and grass (Green Surge, 2015). These “vest-pocket parks” or “mini parks”, as they are also called, represent urban gaps, that is, community green spaces that are characterized by accessibility, safety and environmental comfort. Their unique benefit is that they can be dropped into the urban fabric in many locations where a more traditional, larger park would never be feasible (Harnik, 2009).

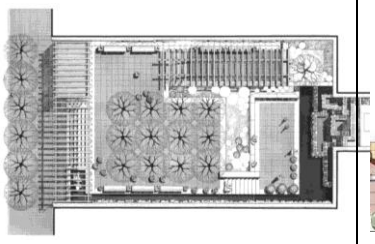
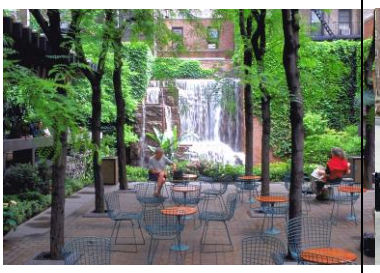
The origin of modern pocket parks begins in North America in 1960s, specifically in Philadelphia, where they were first developed through a program to engage citizens with low income to recover derelict lots in their neighbourhoods into spaces for recreation and leisure (Seymour, 1969). In the meantime, other cities in America and Europe, like New York, London and Copenhagen, have also recognized the importance of these UGS type and their effect on urban environment, social connections and community identity, and launched programs to create pocket parks throughout the cities.

Surface area of pocket parks, according to Marcus and Greene (1998) and Seymour (1969), is less than half an acre, but some sources determine the size of pocket parks depends of other parks sizes in the area. According to National Recreation and Park Association (2012), pocket park is a small outdoor space, usually no more than ¼ of an acre, usually only a few house lots in size or even smaller. In addition to size they have also determined some other characteristics that are common for majority of parks: serve population of 500-1000 residents at 5-10 minutes walking distance; accessible by foot or bicycle, but the use of cars is not recommended; offer a variety of facilities and activities in order to attract as many as different users as possible. What was established through practice and is crucial to point out is that the quality of park is far more important factor of success than its size (Seymour, 1969).

Pocket parks differ from each other. However, three main types can be recognized (Le Flore, 2012): 1) active pocket parks, which offer some type of recreation or activity; 2) passive pocket parks, which generally offer a focal point like a sculpture or a fountain, and 3) bonus pocket parks, which either became parks as people stopped and sat or were designed as a park to utilize space created by a different project. The primary contents of active parks are those used for diverse activities and can include children playground, small court, open gym, dog park, urban garden etc. Additional contents are spaces for seating, plants, trees, gardens. This is the most

difficult type of pocket park to develop as they require greater community engagement, careful planning and determining activities which are needed for both local community and within the larger open space network. In that way it should not duplicate the ones in a nearby park. Passive parks are designed as seating spaces with benches, chairs and tables, but they also contain focal point in a form of a sculpture or fountain. These places are not used for active recreation. Bonus parks were created from spontaneous gathering of residents or users of the surrounding area. They can be public spaces on a private property, or publicly owned (Le Flore, 2012). Examples of different types of pocket parks are shown in Table 1.

Table 1: Types of pocket parks - Examples

Type	ACTIVE	PASSIVE	BONUS
Name and Location	**PRAIRIE DISTRICT PARK** 2051 S Prairie Ave, Chicago, USA	**GREENACRE PARK** East 51st Street, New York, USA	**JILL BROWN RHONE PARK** Massachusetts Avenue #363, Cambridge, MA, USA
Size	0.5 acres	0.13 acres	0.25 acres
Year	2017	1971	2008
Plan			
Photo			
Contents and equipment	children playground, water play, plaza, dog friendly area, benches, chairs, tables, plants, trees	benches, chairs, tables, plants, trees, water sculpture	benches, chairs, tables, plants
Source	https://www.site-design.com/projects/mccormick-place-pocket-park/	https://www.sasaki.com/projects/greenacre-park/	1.https://www2.cambridgema.gov/cac_5_4_2009/public_progress_20.html 2.https://upload.wikimedia.org/wikipedia/commons/b/b0/Jill_Brown_Rhone_Park%2C_Cambridge%2C_MA_-_DSC00293.JPG

The current practice is to transform derelict/unused/undeveloped parks or areas into long-term public use, by providing accessible, good quality local urban green spaces and building stronger and safer communities. Benefits of urban green spaces, including pocket parks, are seen as multiple as they contribute to improve people's health and wellbeing, strengthen social connections and communities, and also government outcomes. Creation and implementation of pocket parks in selected neighbourhood require support of local community and authority, thoughtful planning and creative and attractive design. National Recreation and Park Association has defined a 10-step plan for creating a pocket park in order to help communities to transform derelict areas into new UGS. The plan includes the following steps: 1) secure the community's commitment, 2) convene a steering committee, 3) choose a site, 4) plan, 5) identify and secure potential partners, 6) secure long-term and short-term funding, 7) schedule work days in advance, 8) plan a big work day/dedication/celebration event, 9) implement a maintenance plan, 10) pursue consistent engagement (National Recreation and Park Association, 2012).

Abd El Aziz (2015) defines creation of pocket parks as a 3-phase process: planning - design - implementation. Planning process includes: 1) area selection on the city level (available high populated, devoid of greenery); 2) selecting parcels (analyse location, area and shape, current use and land ownership); 3) linking the park with city's existing green network (streets, pedestrian paths, greenways). Second phase - design process - includes: 1) determining the park type according to the needs of the local community and surrounding facilities; 2) identifying design element according to the needs of local community and design criteria and standards. Third phase – implementation process – consists of: 1) realization of funds: a) short term (construction and land acquisition) and long term (maintenance and repairs); 2) Construction (determining time and task schedules, including volunteers and other participating parties), and 3) maintenance and management (participation of local committee from the residents, non-governmental organization and supervision of local authority) (Abd El Aziz, 2015). It is crucial to initially determine who is developing the park and who is maintaining it.

Ministry of Housing, Communities & Local Government in the UK developed a program called Pocket Parks Scheme in 2015 for protecting and improving the quality of these spaces in most deprived areas which resulted in creation of over 80 new pocket parks for communities until 2018. In 2018 they upgraded their program, thus creating Pocket Park Plus and funding 198 renovated and new pocket parks. The Prospectus "Pocket Parks: helping communities transform unloved, neglected or derelict areas into new green spaces" was published in October 2019 by Ministry of Housing, Communities & Local Government after success with previous programs. The scheme should provide grants and support to community-led bodies and their local authorities. The grant depends on whether the proposed space is being renovated or a new park is being formed and it only covers development of pocket parks but not maintenance as it is in charge of local authority. The focus of this scheme is on making physical changes and promoting activities in certain spaces in order to support local needs, while enhancing the existing landscape and greenery. For this program they defined pocket parks as land areas of 0,02 up to 0,4 hectares in order to support communities to renovate or create new smaller urban green spaces. Considering the ownership, it could be in hands of community, the local authority, public or private sector body or housing association. (Ministry of Housing, Communities & Local Government, 2019)

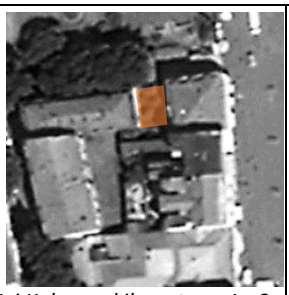
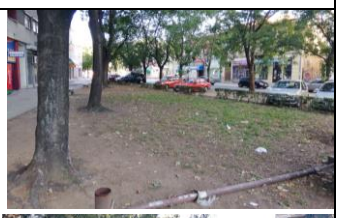
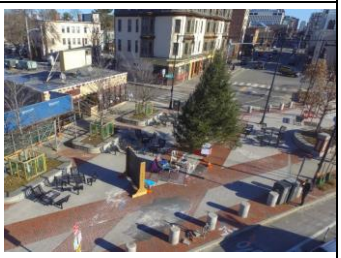
Development of pocket parks can be funded from different sources: public private partnership, private funds, individual contributions, grants, sponsorship. Although most parks are funded by the private sector, there are cases where they are funded by a combination of different sources (Ministry of Housing, Communities & Local Government, 2019).

Examples of pocket park implementation show significant benefits to the community in which they are located and the natural environment. Many of them were created with the initiative of community groups to provide open green spaces in the built urban area. In addition to providing a pleasant and comfortable space for people to relax or use for a particular activity, thus improving their physical and menthal health, pocket parks have shown some more advantages: making safer and sociable communities, empowering local residents to make decisions that affect their community, regenerating derelict/unused areas, strengthening relationships between local authorities and communities, reducing crime (National Recreation and Park Association, 2012). Beside social, they also include ecological benefits: supporting the overall ecology of the surrounding environment, help protecting and conserving local wildlife, landscape, and heritage, reducing pollution (National Recreation and Park Association, 2012).

4. POSSIBILITIES OF IMPLEMENTATION IN THE CITY OF NIŠ

Our planning practice still does not recognize the concept of Urban Green Infrastructure and, consequently, the pocket parks as a type of UGS or their role and benefits of implementation. In order to contribute to the elucidation of the significance of UGI and UGS, the aim of this section is to illustrate the possibilities of pocket parks application and benefits that arise from it at the example of the city of Nis on a conceptual level. Three possible location were chosen in accordance with three types of pocket park – active, passive and bonus. The Table 2 shows selected location, as well as suggestion of possible contents and equipment of parks and benefits of their application.

Table 2: Possible locations in the City of Nis for implementation of pocket parks

I stage – selecting possible location	 *Narodnih heroja* Street, 73 - 75	 *Kej Kola srpskih sestara*, 1 - 3	 *Obilićev venac,* 5 - 13
	Source: https://a3.geosrbija.rs/		
II stage – Analysis of current state			 
	Source: Author		
III stage – Determining type of pocket park	**ACTIVE**	**PASSIVE**	**BONUS**
IV stage – Selecting Possible contents and equipment	• children playground, dog friendly area, seating • benches, chairs, tables, plants, trees	• seating • water sculpture, benches, chairs, tables, plants, trees	• seating • benches, chairs, tables, plants, trees
Illustration	 	 	 
	Source:1.https://www.shutterstock.com//video/clip-21173869-playground-swings-around-edges-two-girls-swaying; 2.https://www.psychologytoday.com/us/blog/why-the-wild-things-are/201501/greening-the-playground	Source: 1. https://www.flickriver.com com/photos/nyclovesnyc/48651067611 2. https://www.pinterest.com/pin/442197257153981408/	Source: 1.https://medium.com/@culturehouse/culturehouse-central-square-pop-up-ccb8ef6d02fe; 2. https://dl tufts.edu/pdfviewer/z603r907c/m613n930d

5. CONCLUSION

Recent theoretical and practical experience confirm that Urban Green Infrastructure can be established as an appropriate concept/strategy/urban planning approach/urban and landscape design approach, which offer interconnected network of urban green spaces that conserves natural ecosystem values and functions, and provides associated benefits to human populations. Pocket parks, as a smallest type of park/urban green space, significantly contribute to the quality of life in the community in which they are located. Depending on the type of pocket park (active, passive or bonus), the benefits of their application are different - from wide range of ecosystem benefits to providing of recreation, playgrounds and other amenities; providing a different types of social interaction by creation of physical-functional and spatial microcells at the neighborhood level; improving quality of life at micro urban level; enabling formation of urban grren space network at the city level etc. However, the possibility of their application depends on institutional, planning and organizational solutions and strategic commitments. Although recognized at research and theorethical level, for our planning practice pocket parks is still a novelty, since the concept of Urban Green Infrastructure has not yet been implemented.

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ICUP2020
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RESIDENTIAL SPACE AS CHANGEABLE AND RESILIENT POLYGON FOR FUTURE LIVING

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ABSTRACT

Communities today are faced with increasingly dynamic changes in the city and especially in their residential parts. It is important to consider how much residential space and its residents have the capacity to accept or endure the different aspects of changes (climate, social, environmental, functional, etc.). Although almost all changes at the city level are focused on public service facilities and spaces, the residential segment of the city is another major function that must be adequately adapted to the change.

In this regard, the research focuses on observing changes and opportunities for achieving resilience in multi-family housing. The premise of the paper is that changes manifest and can be differently absorbed/mitigated at different spatial levels within the residential complex. The paper, through a case study of a selected urban block in Belgrade, presents an analysis of three spatial levels of resilience and transformational possibilities: (1) level of the building, (2) surrounding of the building, and (3) the residential block. The assumption of the paper is that different spatial levels are interdependent in terms of the possibility of transformation and adaptability to different types of changes.

The analysis of three spatial levels in the paper shows that the spatial organization and the qualities of Block 22 can be a good base for adapting to different changes. Combining different responses to change in those spatial levels paper will show how the community and the urban block can be more resilient and can contribute to the general resilience of the city.

Keywords: *resilient communities, multi-family housing, spatial levels, Serbia, Belgrade, Block 22*

1. INTRODUCTION

Architecture is dynamically changing through the 20th and 21st centuries. Economic, social, and cultural shifts enforced changes and the need for development in the field of housing. Starting at the end of the 19th and the beginning of the 20th century, a large number of the population was forced to change their place of residence and move to the cities for various reasons (Heckmann, Schneider, Zapel, 2018, Brankov, 2019a). In the past 100 years, architecture was especially seen as a tool to minimize the economy and housing shortage

crisis after both World wars. Soon afterward it became a way to introduce new, partly futuristic, living concepts in the 1960s.

The complexity of housing is also in anticipating the further development of residential space. As housing seeks utilitarianism in its highest sense it led to the intensification of the useful area and effort to improve adaptability to different forms of use through time. Aspirations to adapt housing to dynamic social changes can be recognized through different periods of development of multifamily housing during the 20th century. Each period is characterized by different needs, changes in population standards, housing standards, etc. Multi-family housing flourished during the 20th century, among other things due to improved industrial production, the use of prefabrication, and the internationalization of labor and ideas (Radović, 2001). At the same time, during the 20th century, the importance of common activities and spaces is emphasized in the design of multi-family housing. In this type of housing, all measures to increase usability can relate to different spaces: building, nearby surroundings, and residential block. That spatial division has its roots in the multi-family housing division of private or public space. The structure of private-public spaces can be divided into privacy parts in multi-family housing in terms of access and privacy: private, semi-public, and public space. In multi-family housing, residents have the opportunity to use the benefits of collective life and it is best achieved if there is a space that in some way unites the interests and needs of users from multiple dwellings or multiple buildings. Teige states that the "heart" of any housing complex that strives for collectivity in housing is its common space (Teige, 2002). Paper thus researches the possible resilience of spaces that are more collective in housing and have a common purpose, as these spaces are more dynamic, need more adjusting to various needs, and can be used by more than one resident.

2. MULTI-FAMILY HOUSING DEVELOPMENT AND COMMON SPACE

The development of multi-family housing and its rise and changeability had several phases tightly connected to the situations and movements during the 20th century. That includes the pre- and post-war years around two World Wars and the reconstruction after them. Encouraged by social changes, the previous way of producing housing was rapidly changing - the emergence of mass production and later prefabrication. The multi-family housing emerged as a way to be an adequate response to the crisis in housing but also to be a resilient solution to possible changes. That characteristic developed throughout the decades to come.

In the 1920s the housing is characterized by the fact that the design focuses on defining solutions following new spatial standards, intending to create standard solutions that allow flexible use of space for the "universal user" (Heckmann, Schneider, Zapel, 2018). The change of functions, due to the centralized mass production, follows the expansion of public/collective services in contrast to the previous functions in the service of the traditional family household. This makes it possible to increase the number of functions for shared use (Teige, 2002; Heckmann, Schneider, Zapel, 2018; Brankov, 2019a). Previously individualized housing services were transformed into centralized services for a larger number of users (outside the apartment/ individual space), to develop a new collective housing system (Teige, 2002). At the end of the 1930s, following the 1940s and postwar years the development of multi-family housing benefited with prefabrication as a tool for new possibilities (Heckmann, Schneider, Zapel, 2018). This way of production opens a path for creating adaptable and more durable (and resilient) solutions. The advantages of such systems were that they improved and speeded up the construction process concerning prior development (Trbojevic, 1975).

During the 1950s and early 1960s, the market changed from necessity housing as a result of the Wars destruction to more resident awareness design. Design lacked a basic connection between the architect's ideas and the needs of the users. This has led to the further development of alternative concepts in housing with new architectural movements (Heckmann, Schneider, Zapel, 2018; Frempton, 2004). Multi-family has focused on the ability to provide a framework for different activities of users because activities change faster than space (Schneider & Till, 2007).

In the former socialist countries, including Serbia, the processes of industrialization and urbanization intertwined. After the Second World War, preference was given to industrial complexes, while housing construction on a larger scale did not begin until the late 1950s (Baylon, 1980). Multi-family housing in Serbia starting in the late 1950s was focused on a new development with the concepts that empowered adaptability and flexibility, especially in the dwelling areas (Marušić, 1975; Brankov, 2019b). Later, at the end of the 20th century the quality in the housing in Serbia decreased, the construction slowly changed as the investors were not anymore dominant State enterprises, but more individual private investors. That shift changed the relation

to space itself, as anything outside of the dwelling wasn't seen as necessary as before and the aspects of the adaptability and resilient home were not as much important to the new builders.

2.1. Collective sphere and common space in multi-family housing

Common spaces are less analyzed segments in housing. One can be a common area inside the building or common spaces outside of the building and within the residential block. These spaces in addition to the communication role can have other contents and be a domain for the collective activities of the residents (Rabinowitz, 2012; Ilić, 1996, Brankov, 2019a). These spaces must favor spontaneous, voluntary mutual contacts of the residents as a precondition for deepening social communication (Ilić, 1996). Emphasizing better utilization of the building or outside areas increases the range of common functions.

Open common spaces on other hand are, as part of residential spaces, an important element whose quality affects the quality of life of residents. The high quality of open spaces in the city also increases the economic value of the surrounding land and makes a good basis for the processes of regeneration of urban areas. Due to the need for rest and recreation, people are daily exposed to the influence of open spaces, especially open spaces that are located near their places of residence. Considering changes, due to uncontrolled construction processes, today's open spaces are significantly reduced, both in the total area, they occupy and in terms of environmental and sociological quality (Brankov&Stanojević, 2020). The differentiation of open spaces in residential areas also depends on the degree of privacy (Lička et al., 2012): private open spaces (belonging open areas of apartments on the ground floor), common open spaces (most often available to the tenants of neighboring blocks, or whose privacy is strictly protected and the possibility of use is limited only to the tenants of the complex in question) and public open spaces. The urban design of open spaces is associated with appropriate functional, aesthetic, and ecological requirements, so they can be evaluated by their morphology, urban and architectural structure, various sociological, psychological, and ecological characteristics (Stanojević et al., 2019).

The common spaces in housing are often not as diverse as might be desired or as much as they could be. They are often forced to serve minimal necessary activities. The users, however, should have the possibility to perform from basic to complex activities in the collective sphere of housing: communication, recreation, socializing, etc. The possibilities of the space can less and less follow the needs and wishes of the users, which would stimulate the development of collective activities. Creating an atmosphere in the collective with certain activities, cooperation and help from neighbors is something that builds a stronger community.

3. CASE STUDY OF BLOCK 22 IN NEW BELGRADE

The Paper analyzes the multi-family housing complex of Block 22. This block is one of the six blocks that have been realized as part of the Central Zone of New Belgrade (next to blocks 21,23,28,29 and 30). Block 22 is located between block 21 in the north, the highway, and block 23 in the south, the congress center Sava Center in the east, and the public part of the block - Arena sports Hall in the west.

This area was selected for analysis as a significant block from the period of development of the New Belgrade. The project of the block was made according to the competition from 1968 by the design of architects B. Janković, B. Karadzic, and A. Stjepanović (Marušić, 1975). Construction was completed in 1976. Part of the block that has residential function is the subject of analysis, while the part with public buildings was not taken into account (Figure. 1).

(a) (b)

Figure 1: (a) Image of the elevated common space, and (b) Inside of the block, view to the passage; source: Authors

3.1. Buildings

Block consists of 5 lamellas buildings P + 6 + Pk and the 2 groups of towers to the west P + 4 + Pk to P + 6 + Pk (Čavdarević, 1978) (Fig. 2). Buildings in typology of lammelas are especially interesting as they inside combine continuous hallways with the modular design of the dwellings. Every modular part has its formed passage on the ground floor that forms the entrance areas. Buildings are corridor typology but are upgrade by adding the dwelling outside, so they form another corridor with the other dwellings and in the middle form a vertical shaft.

3.2. Context close to the building

Surrounding space near the build residential areas is overlapped with the communications of the block. Paper took the surrounding area of the building into analysis because of a couple of specific designs of the block and buildings itself: passages through the buildings' ground floor, denivelated open spaces surrounded by groups of buildings.

Passages are situated on the ground floor of the linear buildings in Block 22. By establishing passages architects enabled multiple entrances into the building and into the residential block itself. In that sense, the inner part of the block is treated equally with the outer part in terms of accessibility. The position of the entrance in that sense orients the user towards or from a certain open space.

Denivelation and segmentation of open spaces is an intentional division of open spaces in the block into smaller and more visible areas, the possibility for that is the use of different ground levels. The design of Block 22 succeeded with half-buried garages to create common spaces above them for the leisure and children play. Also, this directly influences the division of the whole block in 2 types of spaces: ground floor spaces (0,00m) and elevated common areas (for +1,50m). Parts on zero elevation areas are predominantly transit for people to pass or to get to some point, but these spaces are rather more static and oriented towards the residents in the buildings surrounding them (Fig. 2).

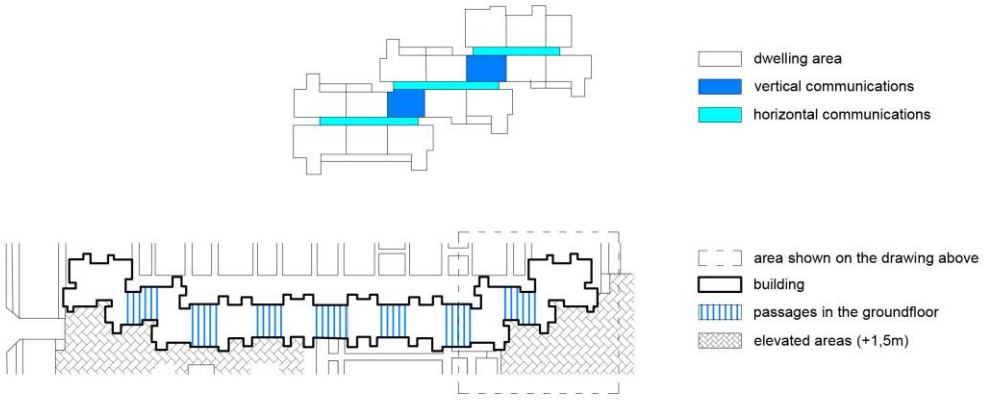

Figure 2: (a) building's typical floor scheme segment, and (b) nearby context surrounding the building in the Block 22; source: Authors

3.3. Area of residential block

The block in the central part has commercial facilities, a playground, and a kindergarten. Almost all the traffic is solved around the perimeter and there are not many internal roads inside the block so that it does not disturb pedestrians in the central part. The space between both groups of towers and longer and shorter lamellae are common spaces raised 1.5 m from the rest of the terrain and as a result of garages and underground shelters that are buried under them (Čavdarević, 1978).

The number of floors and compactness give the impression of an urban character to the block and a return to the dimensions of the city (Marušić, 1975). In the case of a lamella, the horizontal consists of two parallel strips where, by extending one, one moves to the next core, and on the ground floor, this core/ entrance to the building is accessible from the passage. Unlike them, the towers are entered from the "outer" side of the block, while the inner platform is bordered by towers without direct access from the buildings. The space of the block is characterized by a variety of ambiances and segments of space that can be used differently and the block offers smaller, partially more intimate spaces (Fig. 3). The traffic solution along the perimeter and inside the block directly affects the possibility of using open spaces in the block and the connection of that space.

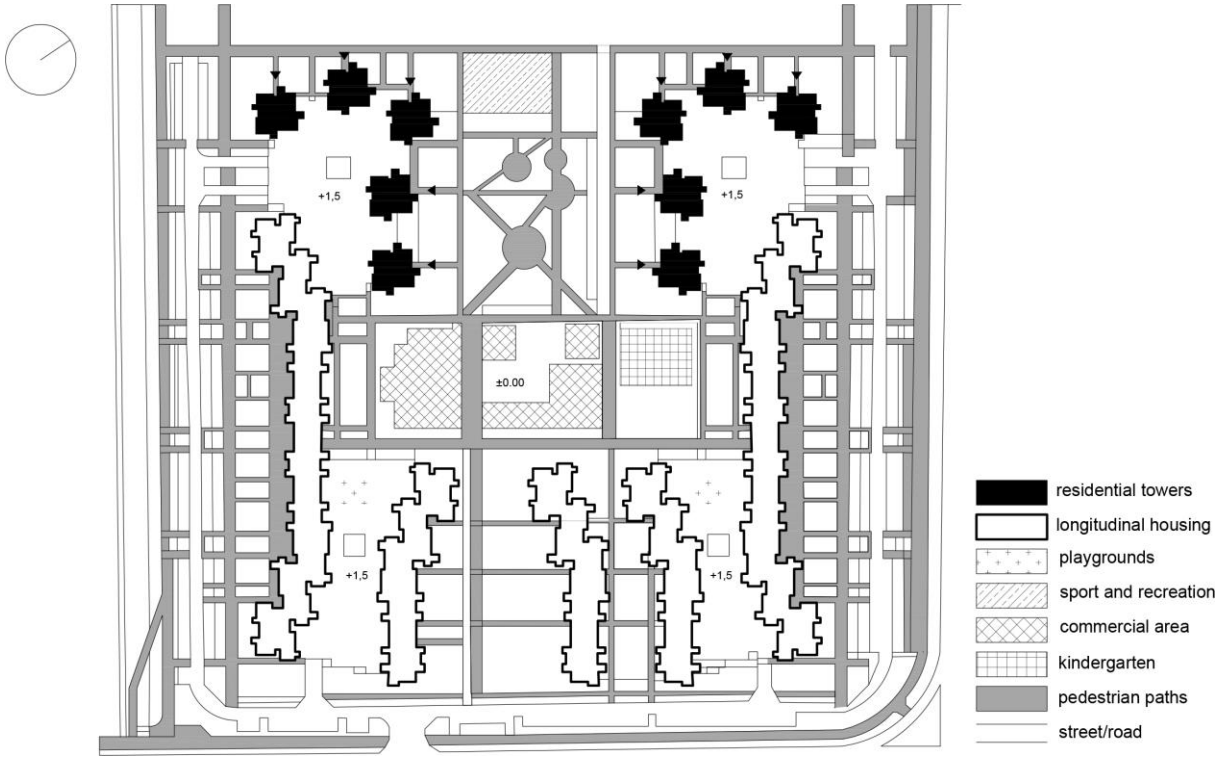

Figure 3: Drawing of the residential Block 22 with different open space areas, source: Authors

4. DISCUSSION AND RESULTS

Resilience and adaptability to change in housing are more complex than in other architectural typologies considering the various needs and problems through the process after putting the space to its use. Resilience in that sense not only should address problems surrounding urban development but should consider future changes in these spaces (positive and negative) which influence the multi-family housing. It should consider the change of its residents, their habits which influence the space they live and use.

In this regard, Block 22 has various levels of possible interventions the resilience in this sense can be in its current variety of spaces that give enough possibilities for the residents but also the future development that can upgrade and add new spaces and functions, which are compatible with the existing architectural design.

Table 1: Resilient possibilities in three scales in the Block 22

Analyzed scale	*Residents focused on specific area (number of inhabitants/users)*	*Types of common spaces*	*Number of common spaces (diversity)*	*Percentage of common space that can be used for various activities (excluding residential part)*	*Privacy level (P-private area – restricted access in the building, PP - private public area, PB – public area)*	*Possible intervention as improvement of the common spaces - participation needed of residents*	*Amount of new functionsthat are possible in common spaces*
Building area	*- smallest building: 90 inhabitants - biggest buiding: around 790 inhabitants*	*horizontal communications, vertical communications, passages, roof, common room near the stairs*	*around 2 common spaces on one typical floor*	*17%*	*P*	*minor*	*small*
Nearby building context	*around 1000 inhabitants and users*	*passages, pedestrian area, elevated common area, greenery*	*4-5 bigger common spaces nerby*	*70%*	*PP*	*medium*	*medium*
Residential block	*arround 3900 inhabitants and users*	*pedestrian area, green area, park commercial area, sports and recreation, elevated common area*	*6-7 bigger common spaces*	*83%*	*PB*	*full*	*medium*

5. CONCLUSION

The analyzed Block 22 is a significant representative of the new modern movement in Serbia in the 20th century. Its design addresses not only residential but open spaces in a manner that anticipates possible future changes in this area. Regarding that, the design of the Block focused on the continuous spaces and paths that can be used for walking, for stationary activities, and further upgraded. When compared to the original design and the present state commercial area is smaller than intended, but its modular roof and construction design make it upgradable and it seems always as this form is large enough. As authors of the Block designed four garages that form the elevated common spaces above them they bordered the central area of the block and made it difficult to force traffic inside the block. This helped preserve the pedestrian attributes of the block.

The block itself is not designed as one big area, but in smaller zones, which can function independently. Regarding that creating elevated areas in the block divides space with a visual barrier. Within the block, there are formed subunits with groups of buildings, which divide the space into areas to which the population of the whole block gravitates, and smaller interspaces between (Brankov&Stanojević, 2020). That creates an opportunity for different activities to be held in different parts of the block. The elevated areas are more prone to just residents' use, which preserved its original purpose. These spaces are not on main pedestrian paths so are not interesting for commercial main activities, which in a way left them intact after all these years.

The conducted research opens the possibility for further examination of adaptability and resilience in existing blocks, especially in New Belgrade. One of the problems in New Belgrade and some specific New Belgrade blocks is the new development which denies existing ideas of the architects or uses green and non-built areas to make more building square meters. That directly implies lower residential and overall standards.

ACKNOWLEDGEMENTS

This paper has resulted from research with the support of the Serbian Ministry of Education, Science and Technological Development.

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SHARING IS CARING: CO-HOUSING AS A MODEL OF STUDENT HOUSING IN SERBIA

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ABSTRACT

Current economic, social, ecological and other issues that affect urban housing worldwide, started a serious research on new sustainable housing models able to fit the needs of a modern man and his hectic lifestyle. Among all the benefits people enjoy today, digital era has also brought many disadvantages, that especially affect social categories, such as young adults, young families, elderly people and similar vulnerable groups. Whether they are looking for flexibility, affordable life space, or the solution to so called "urban loneliness", in a search for an ideal living arrangement, more and more people are turning to co-housing as a new (although old) way of living. In the last years, a model of housing in community has been rapidly spreading across the globe, and has particularly drawn attention to young people, offering, among other things, an alternative and good solution for student living.

Student housing in Serbia is manly based on two models: dormitories, which are mostly in public ownership, and private rented accommodation. For an average Serbian student, economically more affordable housing option is dormitory, but the increased number of students and the lack of accommodation units in dormitories cause that not many students can think of that option. Maybe it is time to look for other options and we are wondering if co-housing can be an additional model to student housing in Serbia?

Keywords: *co-housing, student housing, space sharing, toward resilient cities*

1. INTRODUCTION

In the scope of research of the Scientific project "*Construction of Student Dormitories in Serbia at the Beginning of the 21st Century*" (TR36037), in order to investigate new possible models for student housing in Serbia, this paper connects two, currently quite interesting, topics: *co-housing* and *student housing*. Having in mind the rapid growth of students' number, University modernisation and outdated dormitory models [4], student housing in Serbia has recently become very demanding issue. Hence, the idea of the research is to try to introduce co-housing as a model of student housing in Serbia and this paper will check whether this can be possible. So, let's start with the short insight into: What is co-housing?

2. CO-HOUSING BRIEFLY

Collaborative living, collective housing, mini-communities, bofælleskab, kollektivhus, gemeinschaftliches wohnen, centraal wonen, abitare collaborativo... There are many different words that describe specific housing type internationally accepted as co-housing.[7] Co-housing is form of housing that combines characteristics of both individual and multifamily living. In spatial and organizational-architectural terms, co-housing cannot be described as a certain housing type, because it varies in its schemes and scales, from small buildings inside the city core to huge residential complexes and villages. Anyway, the main principle of this housing concept is based on the idea of community. The pattern of co-housing living can be compared to traditional living in community that has existed in mankind's history from the very beginnings, and is now interpreted in a modern and contemporary way. Benefits of common life of a group of people in the same space are recognized as socially, economically and ecologically sustainable elements and are set as foundation in creation of this kind of housing.

It is commonly spread the opinion that the pioneer in the development of co-housing is Denmark, which during the 1970s of the 20th century began expansion of so called *bofællesskab - living communities*. *Bertil Egerö* in the *Introduction to the Conference report* [7], however, claims that there are good reasons to revise this wider accepted opinion, pointing to the fact that the idea of living together in new housing forms could have been spread more or less simultaneously in several European countries, stating that so-called *BIG* group of Swedes (an acronym for *Bo i Gemenskap* - "*Live in Community*"), which in the late 1970s set themselves the task to formulate a new blueprint for co-housing, gradually discovered similar lines of thought not only in Denmark but also in the Netherlands and Germany. *Charles Durrett* and *Kathryn McCamant*, who have been researching and working on co-housing projects for decades, notice that the co-housing trend spreads rapidly throughout Europe, the United States and Canada, with new projects being planned and built in ever-increasing numbers: "In Sweden, Germany, the Netherlands, the United States, Canada, and now New Zealand and Australia, more and more people are finding that co-housing addresses their needs better than "traditional" housing choices"[5].

Although co-housing is quite new housing typology, the rising number of the projects of this kind globally, indicates that its expansion is taking hold. In his research regarding co-housing and ageing population in UK, *John Killock* explains the popularity of co-housing with this words: "Co-housing has become a popular option within modern society because it allows residents to maintain as high level of privacy and independence as may be desired, but provides many opportunities for residents to interact"[2]. He sees co-housing as "a neighbourhood in which neighbours know each other in a similar way to the notion of a traditional village but in a modern context. It has benefits for childcare, which makes it popular for families, and provides a socially supportive environment which makes it popular for older residents."[2] And this is definitely something that gives advantage to co-housing in comparison to common housing models.

While in, housing, generally speaking, the key element is resident, in co-housing, the most important factor is the social structure of co-housing community. Depending on social characteristics of the inhabitants, co-housing communities can be: multi-generational or of particular age category (older people, young adults etc.). According to [3], contemporary co-housing projects can be divided into three categories: "*Building Together*", which refers to the groups that only share interest in gaining economic and practical benefit through the project in which they join their assets and efforts to produce housing for themselves, without the idea of practicing active social interaction after the project is finished and they have moved in their homes, "*Sharing Everyday Life*", referring to the groups that not only develop their future housing building together, but also plan to share everyday activities while living there, with the aim to facilitate practicalities and without any commitment to religious or ideological beliefs, and "*Serving a Common Ideal*", referring to the groups that not only build and live together, but also share a particular religious commitment, an ideology or a specific lifestyle. From now on, we will focus on the second type of co-housing.

3. ACTIVE CO-HOUSING INITIATIVES

Authors of the paper [6] emphasize that despite the fact that single-family housing is considered higher quality and preferred type of housing in the city, permanent housing crisis in the world, requires adequate housing solutions, which asserts multi-family housing buildings to be considered as a necessity. To make this housing type more attractive and acceptable to the occupants, they draw attention to individualization modalities, which implementation should affect the improvement of housing standard and make housing

qualities much closer to the preferred single-family housing. Followed by this proposal, we came to the opinion that co-housing can be a compromise between single and multi-family living.

For co-housing project to be initiated, developed and realized it is necessary to have serious planning and support. Initiators of co-housing are often self-created groups of people associated in solving their housing issue. They may self-finance and lead the project, but often they need the support from the authorities. Some countries, mostly developed ones (Denmark, as the most advanced country regarding co-housing development, Germany, Scandinavia), have recognized the benefits and sustainability of such projects and have drawn more attention to helping the groups. In that sense, special developing support services are provided and particular models of giving financial backing to co-housing projects are defined (e.g. providing lots to co-housing groups).

Unlike Serbia, where there are no registered co-housing groups, many European countries actively work on the development of this specific way of housing, seeing it as a model of housing for the future. In Sweden there are more than 40 co-housing units, concentrated in the main urban centres of the country, as full members of the association that works on the promotion of collaborative housing and other alternative ways of living (*Kollektivhus NU*) as well as 15 organisations working in favour of collaborative housing [14]. Data from the UK say that there are 21 established co-housing groups, 34 co-housing projects that are in the developing phase and 17 groups that are initially forming its membership [16]. Germany's federal association *FORUM Gemeinschaftliches Wohnen* [9], founded in 1992 with the aim of making the topic of "*New Forms of Living*", now works with 27 regional offices. The association reaches target groups who are looking for new forms of living, for rent or to own and offers support for those who want to start their own housing project with the motto of "*living together, living independently*". Similar associations can also be found in Belgium, Czech Republic, Denmark, Netherlands, Poland, Austria, as well as out of Europe, like in the USA, Canada, Australia, New Zealand etc.

4. CASE STUDIES

In order to better understand the mechanism of co-housing concept and investigate its possibilities in more detail, we made short case study of randomly selected co-housing projects, four of which are presented in this section. Presented projects are estimated as good illustrations for the analysis of benefits and disadvantages that co-housing includes.

Table 1: Case studies

project name	PORTO 15	LANGE ENG	MARMALADE LANE	BASECAMP LYNGBY
location	Bologna, Italy	Albertslund (suburb of Copenhagen), Denmark	Cambridge, UK	Kongens Lyngby (suburb of Copenhagen), Denmark
completion date	2016	2009	2018	2020
type of property	building inside the block of the dense urban tissue	housing complex	housing complex	housing complex
status	existing - renovation, conversion, reconstruction	new	new	new
apartment ownership	apartments to rent	apartment owned by residents	apartment owned by residents	apartment to rent
social structure	young people up to 35 (students, young professionals, married couples, single parents)	multigenerational	multigenerational	students, professionals, seniors
spatial form	single compact structure	continuous closed structure - peripheral row of housing units creates inner courtyard	semi closed structure - perforated rows of housing units create courtyards	continuous almost closed structure - peripheral row of housing units creates inner courtyard
openness to public	open to public	open to public	open to public	open to public

4.1. Porto 15

Project named *Porto 15* [13] (Bologna, Italy, 2015, arch. *Diverserighestudio* in collaboration with *Azienda Casa Emilia Romagna* - Bologna) is considered to be a new way of living inside the house and the city. It is an experimentation with new housing models of collaborative living for young people of age up to 35. The project is the first public co-housing in Italy and has been realized through the joint partnership of public and private institutions, who found different interests to participate in the collaboration - the need to support autonomy of young, innovation of models of public spaces use, retraining of public property and creation of spaces of higher social importance.

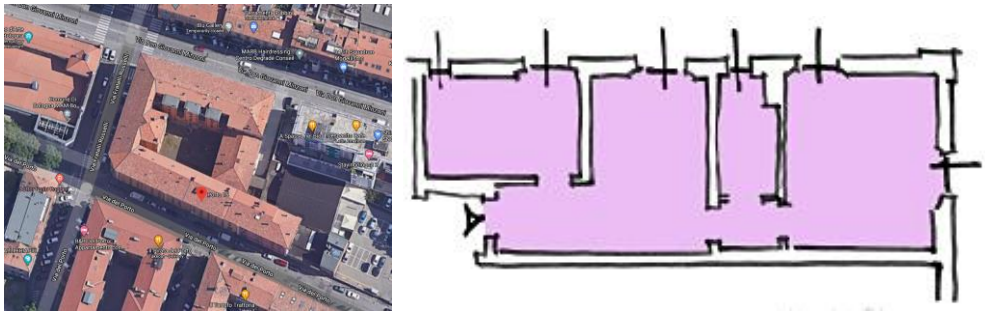

Figure 1: Porto 15 - (a) Building, and (b) Plan of an apartment
Image sources:
https://www.google.com/maps, Accessed 17 September 2020
https://www.porto15.it/index.php/l-edificio/gli-appartamenti, Accessed 22 September 2020

Porto 15 is revitalisation and conversion of existing building into housing community. The profile of community is heterogeneous. The group consists of different professional and social categories such as students, young professionals, employees, young families with or without children, single parents with children, couples and small co-living groups who want to take care of themselves and of others, as well as to take care of living space, to share their time and socialize through everyday activities. The main idea is to create affordable housing for those who are at the very delicate period of life and whose life plans are exposed to the risk due to difficulties in realization of housing autonomy. Essential aim of the project is to find out new possibilities and solutions to the problems that occur in a certain life age - separation from native family, affirmation of individual independence, share of life experience between coevals, joint living of couples, establishment of new family, maternity and paternity.

Affordability of housing is achieved through the mix of individual and shared spaces and lower rent fees. Potential residents should apply for moving in and, if accepted, sign the contract. The list of applicants is public and can be found on project's website. There are different housing typologies inside the building that are offered to residents. Housing units are not furnished, but are left to be fully designed by residents. When accepted, candidates have deadline of 30 days to move in. Contracts are signed for the period of 6 years with the possibility of 2 years of extension.

The main potential of the project is seen in common spaces, which are allocated across all building levels (dining, kitchen, laundry, leisure activities, atrium, workshops, galleries). Beside of being shared in functional and practical way, they all serve as key points for socialization, artistic and other kind of events. The fact that many of social activities that took place inside the building are not only open for residents, but also for wider community, arguments the higher level of social sustainability.

4.2. Lange Eng Co-housing Community

Lange Eng Collective Living is co-housing complex located in Albertslund in the west part of Copenhagen, Denmark. It was designed by *Dorte Mandrup Arkitekter* [10] and constructed between 2007 and 2009. The spatial scheme of the housing complex copies the pattern of typical Danish urban block. Apartments, 54 in total, are stacked in a continuous row that closes spacious common garden. Garden, placed in the center of the composition, appears to be the main social element and the key meeting point - a shared space for gathering and entertaining.

Figure 2: Lange Eng - (a) Complex, and (b) Floor plan
Image sources:
https://www.google.dk/maps, Accessed 17 September 2020
https://arqa.com/en/architecture/lange-eng.html, Accessed 17 September 2020

Social structure of the *Lange Eng* Community is multigenerational. Currently it is inhabited mostly with young couples with children. Apartments are owned by residents. They are of various size, ranging between 72 and 135 m^2 [15]. Their spatial organization is based on the open plan concept, with the content that extends through two levels. Main facade is towards the common garden and is highly glassed, visually strengthening the relationship between individual and common spaces. In the south of the building there is a huge common indoor space - communal house with the area of 600 m^2 equipped with the facilities such as kitchen, dining room for over 100 people, play room, multi-purpose room, music room, computing room, cafe bar, mini football and storage. It is mainly used during winter, while the main activities during summer are held in common yard.

Residents of *Lange Eng* have a high level of privacy, while at the same time, the community offers many possibilities of socializing. And indeed, there is a plenty of activities to be done together with neighbors, the main being gardening or drinking coffee on a long joint terrace. Most of the adult inhabitants of the community are also members of various working groups that organize different social activities and events.

It is also interesting to mention that two main openings that connect inner garden with the surrounding area are not closed, which means that people from the outside of community can enter the garden and use it as a public park. This idea blurs the sense of ghettoisation that can often be present in complexes of this kind.

4.3. Marmalade Lane

Marmalade Lane is the first co-housing development in Cambridge, Great Britain, designed by *Mole Architects* [11] and completed in 2018. The project was realized with the support of government, who recognized importance and potential of K1 co-housing group's idea to create custom made, community oriented sustainable housing settlement. Seeing it as an attractive model for future housing, Cambridge City Council, owner of K1 lot, the site predicted for the realization of the project, agreed to cooperate and prescribed an open developer competition.

Figure 3: Marmalade Lane - (a) Photo of the complex, and (b) Floor plan
Image sources:
https://marmaladelane.co.uk/#cohousing, Accessed 22 September 2020
https://www.archdaily.com/918201/marmalade-lane-cohousing-development-mole-architects, Accessed 22 September 2020

The co-housing settlement is multigenerational and consists of 42 homes in a form of terraced houses and one/two-bedroom apartments, together with common facilities – the common house (with gathering spaces and bedrooms that can be booked for guests on request), garden, waste stores, car parking, placed on periphery, and huge cycle parking. The emphasize is given to custom-built design, meaning that households had a chance to participate in the creation of their future homes. Future tenants could choose between few offered "shell" types of their houses and external materials, with the possibility to configure floor plans together with designers. Housing units are placed with the facades facing existing streets and newly introduced Marmalade Lane. Spatial arrangement of the buildings creates huge inner garden, open towards south and connected with common house, a focal point for social activities and different events and metaphorical membrane between private and public spaces.

Social structure of K1 co-housing is very diverse. Residents come from all ages and professions and include families with young children, retired couples and young professionals. Members of K1 community are also of different nationalities (11), longstanding Cambridge residents and people relocating from elsewhere [12].

4.4. Basecamp Lyngby

Basecamp Lyngby in newly built co-housing complex (2017-2020) in small town Lyngby in the vicinity of Copenhagen, designed by *Larz Gitz Architects* and landscape architect *Kragh & Berglund*. It occupies area of around 41.000 m^2 and is aimed to be sustainable shared living community for 900 students, PhDs and senior citizens.[8] The location of the campus is very naturally oriented, as is the building itself. In the near of the site there are Lyngby Lake and the UNESCO preserved park Dyrehaven, which create calm and eco-friendly atmosphere, suitable for walking, sailing, biking and many other activities. The building structure draws inspiration from the environment and blends perfectly with it. The composition is very organic and unobtrusive. It seems like it grows up from the earth and waves spontaneously, creating a bunch of interactive spaces. The concept resembles the first Danish co-housing models and the very basic idea of community living, where private homes were clustered around the shared space. The housing units of the campus are placed in a long curvy tape, while in the middle of the closed composition is placed central construction that holds main common social activities, facilitated with amenities such as cafe, gym, workshop, cinema, library etc.

Open green spaces are seen as key social points of the project. Everything is imbued with greenery - inner courtyards for more intimate atmosphere, as well as long green walking roof that stretches along the whole building, rising up and down, for stunning views, gardening, walking and jogging. Sustainability reflects in each segment of the project - social, economic and environmental. The complex is not restricted only to its residents, but is also open to public. It welcomes every visitor and allows him to use all the common content. That enhances social contacts, and at the same time increases economic self-sustainability of the construction. Colorful social structure creates unique and diverse experiences for those who live and gravitate there. It blends different generations under the same roof and draws the best from their mutual coexistence. It offers opportunities of interactions between students, young professionals and seniors which can lead to creative and productive everyday and professional life.

Figure 4: Basecamp Lyngby - (a) 3D view, and (b) Floor plan
Image source:
https://www.theplan.it/award-2020-housing/basecamp-lyngby-a-socially-interacting-super-structure-lars-gitz-architects, Accessed 30 September 2020

5. CASE STUDY CONCLUSIONS

Case study analysis of realized architectural co-housing projects, four of which are presented in the previous section, has helped to synthesize specific characteristics of this housing typology and effects which living in co-housing can cause on its residents. Those effects are classified according to four criterions: psychological, economical, comfort, urban and are filtrated through positive and negative categories, which show potential advantages and disadvantages of co-housing approach.

5.1. Advantages

Research has shown that co-housing implies and results with numerous positive elements, which directly or indirectly occur during different phases of architectural design, construction and utilization of the building. The first two phases are more oriented towards economical aspect, while the second is mainly focused on social.

1. Psychological effect

- Stabile neighbourhood - "Co-housing helps individuals and families to find and maintain the elements of traditional neighbourhoods - family, community, a sense of belonging - that are so sorely missing our society."[5]
- The interaction between different generations can affect the social development of the people in a positive way. Residents benefit from each other and their mutual support in everyday activities. Young people can learn from the experience of the old and old people can refresh their everyday routine with fresh ideas of young. This may encourage the transmission of positive energy and affect "passive" individuals to move.
- Level of individuality/commonality can be set according to personal preferences. One can enjoy the company of community members or retreat to his privacy upon request. Psychological disorders of today, like depression or anxiety, are less expected to be present in environment deprived from loneliness.
- It is more likely to create closer relationships with other people (easily to make friends).
- Expressed solidarity and willingness to help (in childcare, chores, education).

2. Economical effect

- Possibility to finance the construction by joint forces of particular co-housing group. (Easier way to reach own home.)
- Possibility to be supported by other parties, who have non-profit interests and are willing to support sustainable living models.
- Lower living costs.
- Possibility to afford expensive amenities (swimming pool, gym) with less investment.

3. Comfort effect

- Participation in design process and hence customization of living space according to personal preferences.
- Availability of wide range of contents, usually not accessible in conventional houses/buildings.
- Possibility to balance between privacy and publicity upon personal preferences and current needs and wishes.

4. Urban effect

- Urban renewal.
- Social revivification.

5.2. Disadvantages

It turned out that co-housing is far less characterized by negative features in comparison to positive ones. Disadvantages are mainly based on personal nature and are subordinated to personal attitude of user and his affinities. That means, one can simply love it or not. Potential negative approach towards co-housing is rendered in propensity to living in community. Two major disadvantages would be:

- Co-housing as a collaborative housing and particular alternative way of living is not suitable for every person. It can require higher level of flexibility. One should be able to accept the responsibility of sharing, meaning should be flexible.
- The life in commune can be "hustle and bustle".

5.3. Benefits for students

Among many specific characteristics that describe co-housing, we found those who are particularly important for students. Here is the shortened list of benefits students can gain while co-living:

- Living in a heterogeneous environment can help students to build a different network important for their professional and personal development.
- Living in co-housing creates family-like atmosphere and the sense of belonging to certain community. For students who have to move from their hometown during study period, co-housing can help with the integration process in new environment.
- Co-housing way of living is more adjusted to working people and modern lifestyle. Co-housing offers more comfortable, suitable and equipped accommodation in comparison to rented apartment.
- Although co-housing isn't exactly like a dormitory, it is somewhat similar, so students used to dormitory life will adapt to co-living fast.
- Frequent events offered inside co-housing can enhance social activity of students.
- Community-like living affects development of one's personality. Personal features like responsibility, tolerance, teamwork, humanity, environmental awareness and alike are more likely to be acquired in an environment like this.

6. CONCLUSION

The rising number of co-housing projects intended for students demonstrates the fact that this typology is suitable for student living and is accepted by students. By searching the market, one can find many advertisements that offer students possibility to live in such environment. The number of companies and start-ups running the private holdings which rent rooms, studios or apartments inside the co-housing (e.g. *The Collective*, *Starcity*, *WeLive*, *Common*), states the fact that co-living in general is becoming not only popular among young who search for temporary home, but also among business people who are in search of a profit.

As [1] mention, "the co-operative housing movements at the beginning of the twentieth century was already based on the perception that housing means more than just having a roof over your head, but also includes aspects of community and communal infrastructure". Having in mind all the good and the less good/ bad things that it brings, co-housing can be graded as desirable, affordable and sustainable housing typology for a society. Higher sustainability is obvious in many aspects, primarily in ecological, economic and social.

From the very beginning of its origins in 1960s/1970s of the last century, co-housing has always been followed by environmentally conscious ideas of living and this trend has never stopped. Co-housing projects abound in eco-friendly solutions both in architectural design, maintenance and use of the building, which are also translated to the lifestyle of inhabitants. Living green is often the central motto that coexists in community's philosophy. Elements such green roofs, bike use, reduced motor traffic, reduced energy consumption, water reuse, solar energy, gardening, organic self-made food are some of the key features that circulate through co-housing projects. Economical sustainability is recognized in the reduction of apartment's area, common use of certain equipment, joint meals, self-maintenance and servicing of the building and open spaces, energy savings and social work. All that makes co-housing cheaper for living and affordable to wider population. The facilities that an individual cannot afford when living in "standard" apartment or house, now are reachable, because are shared, which also affects more comfort lifestyle one can benefit from. By using common laundries, household and garden tools or similar equipment, the space in the apartment needed for auxiliary content is reduced, which allows the total area of the apartment to be smaller. Existence of huge common kitchen, dining area or guest rooms, gives the possibility to downsize or drop out such spaces from the apartment. Knowing that larger quantities of food can be bought for the best prices, more or less frequent joint meals prepared weekly by residents in common kitchen, affect the residents' food expenses to be lower. Further, in commune, consisted of people of different ages, interests and occupations, an individual willing to participate in common works of building maintenance can always be found, which means budget savings, since there is no need for professional service to be engaged. Co-housing doesn't only affect the life of its community, but also the life of wider community. Its impact expands beyond micro level and have an effect on macro location, i.e. neighbourhood and the city. In order to enhance the wider interactions and prevent ghetto-oriented environment, co-housing community usually opens some of the common facilities to public, so big part of the content is accessible to neighbours (parks, cafes, restaurants, libraries, cinemas, workshops). By organising different cultural, sport and leisure events, social interactions happen between the residents or between residents and non-residents, which incite the co-housing to occasionally change its main residential function and become public venue. On the other hand, it also affects financial aspect, enhancing the financial self-sustainability of the community.

By analysing co-housing projects around the globe, their architectural concepts, social aspects and economic issues, it can be concluded that this housing typology is seriously becoming model of future housing. Although currently mostly spread across developed countries, it can be a good model for undeveloped countries too, especially when it comes to its economic aspect. Serbia, as a modern country in its developing phase, with its characteristic social framework and context, can definitely be a good candidate to introduce co-housing in its residential network. We started the research on co-housing as a model of student housing, but concluded that co-housing can not only be a model for student housing in Serbia, but for housing in general - for housing of wider social groups. It can rise the quality level of housing, i.e. of people's lifestyle, in this case of student's lifestyle, due to many various additional services, that are for common use.

Government should consider co-housing typology as sustainable housing model and support it. Co-housing is suitable for many social categories, who are in a way specific or vulnerable in relation to general society: young adults (not enough recognized as particular social group in Serbia who needs housing support), among them students and young professionals, and elderly people. Instead of focusing on each group individually, one can consider them together, as a heterogeneous group that can jointly function. Although the interests of each mention category are different, their mutual combination can result in all-round contentment, because co-housing is not only considered as concept of sharing spaces, but also of sharing everyday life.

ACKNOWELEDGEMENTS

We would like to express deep gratitude to the Ministry of Education, Science and Technological Development (Serbia) for the support in the realization of the Scientific project "*Construction of Student Dormitories in Serbia at the Beginning of the 21st Century*" (TR36037), in which framework this research was done.

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COMMUNICATING BUILT HERITAGE - SEMIOTICS OF INDUSTRIAL HERITAGE IN THE CONTEXT OF URBAN TRANSFORMATION

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ABSTRACT

Contemporary urban landscapes of majority of world cite are full of industrial residues and landscapes. Accordingly, the strategies of sustainable urban landscapes that integrate also heritage promotion and protection are tightly connected with concepts and solutions for remodelling and integrating the industrial landscapes with the urban landscape. Reshaping the industrial heritage consider both, physical transformation and interpretations of industrial narrative and history. In this context, communicating urban history and the image of the place is a crucial point in achieving heritage promotion aims. This paper analysis the non-verbal communication of the built heritage used in building conversion design solutions that integrate the heritage and non-heritage buildings. The paper used the analysis of semiotics of selected exemplary projects as a research method. The main assignment of the paper is to present and systematize the possible concepts of sharing industrial past and heritage through contemporary (re)design solutions with a different approach towards a heritage. The discussion and final remarks focused the applicability of the presented concepts in relation to the heritage protection restrains and sustainable development goals (SDGs) defined by UN.

Keywords: *industrial heritage; semiotics; architectural design; built heritage; heritage presentation*

1. INTRODUCTION

Sustainable development of urban areas implies, as an important part of this initiative, heritage preservation. Heritage is also seen as a driver of development because it is considered as an additional quality that contributes to the development of culture and preservation of history and at the same time a comparative advantage for a dynamic market of urban space and activities within it. Additionally, focusing on industrial heritage and industrial brownfields, sustainability also refers to the simultaneous ecological remediation of these problematic areas of urban space. Having this in mind, the redevelopment and transformation of an

industrial area affect all the pillars of sustainable development: economic, socio-cultural, and environmental, and it can rightly be given priority in the studying, strategic planning, and implementation of decisions that focus on sustainable development of an urban area – a city, district or so.

Yet, it is not always quite clear how to deal with the built heritage, specifically industrial heritage. While there is a wide range of possible heritage-based concepts of urban redevelopment, the academia and professionals are still arguing whether dealing with heritage means just historical conservation or may include other more flexible concepts. Many authors and architectural professionals (Cossons, 2002; Hristov et al., 2020) agree that there is a room for far less rigid heritage management that includes balancing between old and new structures within a very limited area, for many reasons: improvement of the built environment, better suitability for new urban uses, greater efficiency in the use of space, supporting diversity and advancements, etc.

In this regard, it is assumed that industrial heritage may be presented in various ways within the old-new urban setting, with the aim to promote and maintain the image and narrative of the past times. On the other hand, not every industrial heritage is communicative in the same way, it cannot touch the feeling of the observers/users in the same way. It depends on the quality and characteristics of the original structures that are also bearers of the meanings in architecture and urban space. The aim of this paper is to present the possibilities of the use of certain industrial symbols to emphasize and share the industrial past while transforming an industrial environment into a contemporary urban space. The purpose of this analysis that is rooted in the semiotic of architecture is to identify potential places of intervention in a way that enables the preservation of the meaning of industrial architecture, with the aim of contributing to the solution of specific design problems, ie design dilemmas. The discussion was conducted in the context of a practice that implies both a conservative approach and the freedom of interpretation of industrial heritage outside the conservative framework of protection practice.

2. SEMIOTICS IN ARCHITECTURE – THEORETICAL FRAMEWORK

Basically, semiotics is the science of signs and their meanings. It is also the science of creating meaning or interpretation of signs, signaling processes, and meaningful communication (Deshpande, 2016). This includes the study of signs and signaling processes, as well as the study of indication, design, similarity, analogy, metaphor, symbolism, meaning, and communication. Originally, semiotics was connected with linguistics, but Barthes (Barthes, R. and Leach, 1997) associated semiotics with any system of signs, regardless of the content or limitations of that system. Semiotic meaning can be derived from images, sounds, gestures, and objects. The labeling system could encompass many forms of the social and ritual convention, according to Barthes.

This implies that semiotic theories can be linked to architecture. Architecture is similar to language as it could be seen as a system of signs. Every form created in space by architects and its meaning for the observer (user or consumer) is a phenomenon of communication by means of spatial signals or forms. In this process, different users are constantly supplementing these mental images (or forms) with complex information, by introducing semiotic values. Thus, the process of creating an architectural form is the process of processing spatial information (Prokopska, 2002). Semiotics is not only the science of signs and sign systems but also deals with cultural phenomena as a system of signs, identifying culture as communication, where the expression of architecture becomes a relevant object of analysis. Hale (2000) points out that architecture can be seen as a "language of expression" as well as a means of providing useful shelter. In addition to discussing the types of signs and signifiers, semiotic theory focuses attention on the analysis of meaning, understanding the signs. There are two types of meanings of a sign or symbol, or signifier. These are denotations and connotations. Denotation refers to the visible, undisturbed, superficial (literal) meaning of a signifier; while connotation means what the sign connects with a certain idea, concept; it refers to a deeper or hidden meaning and association or interpretation. While the relation between sign and denotation is direct, the connotative meaning is arrived at by interpreting meaning. This means that there must be a capacity (prior knowledge, context) for the interpreter to understand the connotative meaning. This can be represented by a semiotic triangle (Figure 1) - the base represents a denotative relation, the arms of a triangle are a connotative path to the meaning.

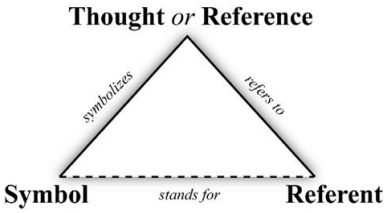


Figure 1: Semiotic triangle (Peirce's)

The semiotic triangle (Figure 1) in the context of architecture can be defined as a relation:

FORM/PHYSICAL PHENOMENON (symbol) - INTERPRETATION (thought or reference) - CONCEPT (referent)

Buildings have the ability to communicate by conveying information about how a building is used. Koffika (Koffika, 1935 in Krampen, 1989) called it "demand character", Lewin also called it "invitation character" or valence (Juodinytė-Kuznetsova, K., 2011; Lewin, K. in Krampen, 1989). The conceptualizing buildings involve different narrative programs that can change during the exploitation period, and the final result of the construction is the resultant interaction of different programs and anti-programs that go through stages of agreement, preparation, implementation, and approvals. Historical buildings, as well as those that have existed for a long period of time, have a conflict of programs and anti-programs and their semantic values, because every subject, a stakeholder that influences the construction wants to achieve its own goals.

Generally, the building combines two processes. The first refers to the construction of buildings and the second to the process of evolution of the meaning of buildings through their everyday use. Also, all subjects create their own meaning. Architectural semiotics is never just connected to an object as it seems from the hands of the builder because those who use it can redefine it and change its original meaning. An architectural object is not only created with the help of dimensions, but it is also a socio-cultural process. The semiotics of architecture can be thought of as the semiotics of space. In a narrower sense, it refers to buildings and how their meaning takes shape and corresponds to our senses (Juodinytė-Kuznetsova, K., 2011). Architectural space can be considered a concept that is constructed and modified by human subjects, who perceive space not only visually, but using all the senses - 85-90% of information about the environment a person receives with the sense of sight, while other senses: hearing, smell, touch, and dr. participate in 10-15% of perceptual experiences of the environment (Barabanov, 1991, 1992 in Deshpande, 2016). Also, people organize their space reflecting differences in social and cultural life. Holl (al. Et al., 2006) defines architecture as "the art of space", finding that "its fundamental task is the artistic manipulation of space ... buildings and cities allow us to structure, understand and remember realities that would otherwise be formless and to finally, we recognize and remember who we are."

3. SEMIOTICS IN ARCHITECTURE AND LEVELS OF PERCEPTION

Semiotic signs may be perceived at different levels of perception - from a rough perception of building form from a distance to the tactile perception of facade surfaces, their texture, color, materialization, and detail. Krampen (1989) found, by examining the cognitive process of "reading" architecture, that this process follows certain rules: a) the accumulation of signs determines more accurately the building; b) less information (signs) implies greater dilemmas regarding purpose; c) there are several levels of perception of the architectural building, which can follow this sequence: form; roof shape; the number of floors; facade articulation; other visible functional elements; materialization (texture and color); signs (symbols), visible activity (transparency). So, semiotic signs that indicate some meaning could be divided into global images (from distance) and detail (up close). Global images (silhouette, characteristic shape, etc.), anything larger in size are part of the social memory that emerges over the years.

Regarding the differences among the semiotic signs, using linguistic terminology in architecture Eisenman recognized three semiotic categories - semantics, pragmatics, and syntactic. These three categories can be brought into line with Pierce's division of semiotic signs on the icon, index, and symbol (UKEsseys, 2018) Semantics refers to the relationship between form and icon, pragmatics refers to the form that ensures functioning, and syntactic refers to the relationship between physical forms in conceptual space.

The expressiveness of architecture and the possibility of reading signs in architecture is doubtless because, without it, society would not be able to consume, to use, architectural buildings. However, different approaches in architecture exploit different instruments of expression of architectural forms using different

semiotic categories of signs. These variations in architectural expressiveness will be discussed in the following chapter along with a short overview of the history of industrial architecture.

4. OUTLINES OF INDUSTRIAL ARCHITECTURE & INDUSTRIAL HERITAGE

In order to discuss the semiotics of industrial architecture, it is necessary to summarise its basic characteristics. Industrial architecture does not represent a homogeneous set of architectural structures; they differ according to numerous parameters, a few, the most notably, to mention: built period, typology of urban form, type of structure, used façade materials, and architectural aesthetics as well. Depending on the degree of industrialization as well as the time of initial industrial development, different regions in the world have developed different associations towards their own industrial past. Generally speaking, regions with a long history of industrial development have more diversified industrial architecture, while regions with more recently developed industries are characterized by the lack of industrial forms and types characteristic for the earlier periods. Because of that difference, the attitude towards industrial brownfields and industrial heritage is very delicate and depending on the region.

Also, researchers oftentimes highlight the difference between labor-intensive and extensive (or heavy) industries. (Asparuhov et al., 2019) The first type appeared historically first, and it is characterized by structures that are more inclined to conventional, human-orientated buildings, while the second type is been developed since the early 20th century and may be described as “raw” industrial structures that focus the production process, less the employees’ needs. While the first group nowadays is important due to the history of collective labor work and life, social events that took the place and so; the second group still fascinate people by the size, rawness, and unusual structures that were forbidden for the most of people. The former is perceived as flexible for conversion, later may be found challenging for functional conversion.

Therefore, it is possible to make a differentiation of industrial architecture according to the built period (Douglas, 2006; Jevremovic et al, 2012). Researchers defined three major periods:

- I period: developments built before the 20th century - belongs to (neo)-classical architectural tradition, inspired by the architecture of earlier epochs. The industrial architecture of this period has a tectonic nature, while its expressiveness is found to be semantic by the type of signs that communicate with the viewer by exploiting the types and typological building forms and traditional building materials (brick, mortar, wood, iron, and, later, steel). Although the classical architectural tradition is based on similarity and uniformity of build environment by type of structure and used materials, industrial architecture of that time may be recognizable by shed-roof (saw-tooth), basilical form buildings (oversized), and mills (multi-story masonry buildings)
- II period: the industrial architecture of the modern period, built until WWII – belongs to the modernistic architectural tradition that appeared during that period. The industrial architecture of this period and modern movement are tightly connected and intervened in influencing each other. The pragmatic expressiveness of modern movement derives from the functionalist approach to the creation of architecture. This is identified with Pierce's category of "index" (a sign defined by a direct connection to what it represents). By pragmatic signs, we mean recognizable functional elements, readable in the external expression of architecture such as stairs, canopies, balconies, etc. While relying on individual parts of objects, the global form may remain without sufficient cognitive values.
- III period: the industrial architecture of the post-modern period, built after WWII – belongs to the post-modern architectural tradition. This period expanded the search for the meanings in architecture which resulted in a plurality of architectural expressiveness and experimentation in building concepts. Postmodern architectural thinking was close to the idea of syntactic (and symbolic) expressionism which was supported by the development of abstract concepts and pursuit of autonomy of form in relation to function. This category of signs is extremely dependent on subjective factors of perception, such as the ability of aesthetic perception, orientation towards perception, emotional status, etc. (Deshpande, 2016)

5. COMMUNICATING INDUSTRIAL HERITAGE IN CONTEMPORARY REDESIGN CONCEPTS

Reusing existing industrial heritage and structures that reminiscent the past times are legitimate concepts of urban redevelopment strategies. The transformation of the industrial buildings implies the possibility of re-reading architecture expressiveness and assigning new meanings to the buildings. However, if there is the significance of a building, rooted in its history, then it is necessary to provide opportunities for reading and highlighting that history. History can be signaled in several ways, and one of the safe ways is to maintain the authenticity of the architectural structure, but also at the same time to maintain the authenticity of its condition in terms of traces of wear and tear over time. Historic buildings actually are not just monuments (without basic functionality), although there are some exceptions. In this sense, although having been transformed to satisfy some other new use, the existing structure can transmit information about the history of the place.

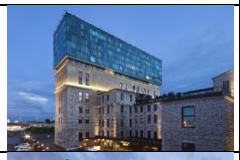
The context of the urban transformation of industrial brownfields is defined by post-modern discourse, which uses a plurality of approaches and ideas in expressing architecture and conveying the meaning of a building. On the other hand, the urban structures that are the subject of transformations and thus participate in the creation of new roles (purposes) and meanings, belong to either traditional architectural discourse (industrial buildings of the 19th century, pre-modern industrial structure) or modern (industrial buildings of the 20th century, the most of industrial buildings built in the middle of the 20th century, after World War II). In this sense, the analysis of the architecture of transformed industrial buildings in the context of communication, marking new roles and uses, leads us to the syncretic fusion of new and old, not only at the level of physical structures but inevitably and much more importantly, to the intertwining of new and old meanings, implies some form of reinterpretation of existing structure.

5.1. Research methodology

The first step was to define the method of choosing cases to study. As industrial architecture may be divided into three periods that are characterized by different concepts and strategies in design, this research identified the most prominent representatives of industrial architecture for each period based on the idea of architecture as a system of semiotic signs. Then, the second step was to define the parameters for the research. Focusing on the transformation of former industrial structures, we traced the status and the treatment of the semiotic signs in this process. This was done by identifying the physical qualities they have before the transformation, in the period of active industry, and the same qualities upon transformation. Physical qualities we traced over time were defined by several categories: general form, façade & materials, and detailing. This was then according to previously defined levels of observation of semiotic signs. In the following Table 1, we presented in synthetic manner results of analyzed cases.

Table 1: List of examined project and results of the analysis

No	*Thumbnail picture of the project*	*project name, location*	*general form*	*materiality, and facade*	*detailing*	*scen ario*
		built period	*changes of to the form*	*change of façade*	*additions / changes in details*	
1.		*Xi'an Dahua Textile Mill, Xian Shi, China*	*saw-tooth roof structure*	*brick walls & concrete panels*	*no*	*S3*
		II	*yes, moderate additions, integrated*	*no*	*no*	
2.		*Former Granary, Gliwice, Poland*	*multi-story mill*	*brick masonry walls, repetitive windows*	*modest opening ornamentation*	*S1*
		I	*yes, minor change, focused, distanced*	*no*	*no*	
3.		*Gearwheel Factory, Amsterdam, Netherlands*	*saw-tooth roof structure*	*brick walls*	*no*	*S2*
		II	*no*	*yes, minor changes*	*no*	
4.		*Shed #19, Cadelbosco di*	*basilica form*	*plastered facade*	*no*	*S2*

		Sopra Italy				
		I	*yes, modest subordinated additions,*	*no*	*conserved modest deterioration on facade*	
5.		*MJH Gallery of iD Town, Shenzhen, China*	*great hall*	*windows glazing in concrete frame*	*no*	*S1*
		II	*yes, minor subordinated addition*	*no*	*conserved heavy deterioration on the facade*	
6.		*Gucci hub, Milano, Italy*	*shed roof structure*	*brick walls*	*no*	*S3*
		I	*yes, moderate addition and demolition*	*no*	*no*	
7.		*h*	*great hall*	*brick walls*	*no*	*S1*
			yes, moderate parasite additions	*no*	*no*	
8.		*Batawa Lofts, Batawa, Canada*	*multi-story building*	*window glazing in the concrete frame*	*no*	*S1*
		II	*yes, moderate parasite additions*	*no*	*/*	
9.		*LocHal Library, Tilburg, Netherlands*	*great hall*	*windows glazing in the steel frame*	*no*	*S2*
		II	*no*	*yes, new glass layer*	*no*	
10.		*Auditorium Paganini, Parma, Italy*	*multi-story buildings*	*mortar, repetitive windows*	*no*	*S2*
		I	*yes, minor additions (interpolations)*	*yes, partial removal and replacement with glass wall*	*no*	
11.		*Fahle House, Tallinn, Estonia*	*multi-story buildings*	*stone masonry, repetitive windows*	*minor façade detailing*	*S3*
		II	*yes, major overtop addition*	*no*	*no*	
12.		*Cannon Design Regional Offices , Saint Luis, USA*	*great hall*	*brick walls*	*yes, extensive geometric ornamentation of brick masonry and openings*	*S1*
		II	*no*	*no*	*no*	
	Photos & projects' information source: Archdaily, https://www.archdaily.com/					

5.2 Research results discussion

This research does not ask only how to communicate the history, but the new purpose and assignments as well. It is a new complementary part of the overall communication of the building with the "reader" (observer, user). Industrial buildings and other industrial structures that in its original form express sings of semantic nature (or icon) tend to be resilient to the transformation process. This is based on the idea that the general form of building, observable from the distance, as the most prominent quality of semantic meaning, is less inclined to be changed in the transformation process. We identified the following possible scenarios:

- Scenario 1. A building form of the historical buildings expresses a high level of adaptability and suitability by transferring the meanings of the given form from industry to the novel use. At the physical level, history is been preserved but the form does not help highlighting industrial narrative. The existing building form does not send enough information regarding the specific industrial

history, while this assignment is given to more detailed information: materialization, façade details, structure, etc. The industrial past is blended within a contemporary setting, while the physical structure acts naturally with new uses.

- Scenario 2. The typology of building form does clearly differentiate the industrial building by the expressive features observable from the distance, e.g. shed-roof or so. Clear determination of the past and history from the distance, implies that a more detailed level may be changed and redesigned without losing the narrative of history. The industrial past overshadows the new uses and its features.
- Scenario 3. Typology and form are not readable easily, as inherited features or as a result of the transformation process while there are still recognizable functional details. Having lost their functionality, these details become a symbol that derives from the people's understanding of their prior usage, although the context faded. This implies that prior structure may be transformed and as long as the symbol remains. It would be strong enough to reference the past narrative. Pragmatic signs transformed into symbolic signs of the industrial past have interpretative nature embedded in the familiar industrial narrative. Still, there should be noted that many of these functional details are highly contextual and without a proper setting, it would be very hard to stand for the past. Here, the current status of the site overcome the historical past that remains in fragmented parts.

6. CONCLUSION

The inevitability of the active inclusion of industrial heritage in contemporary trends of urban development must not be neglected in any initiative that involves dealing with these already built areas. In this context industrial past may be a factor that adds value to the contemporary urban environment. Our research of semiotic signs of the industrial past have brought us the following conclusions:

- Depending on the qualities of the historic industrial structure the signs may be divided into the three major categories – building form, materiality, and details.
- Depending on the position for the reading the signs of industrial architecture, there could be identified two possibilities: i) reading the past from the distance and ii) grasping the meaning and narrative of the remaining physical structure up close to the detail.
- General forms (several types) of industrial buildings are found to be the most dominant signifier of the history and the past. This suggests that the common practice of manipulating these forms significantly may reduce its capacity to nurture the past.
- On the other hand, details, and façade usually lack authenticity and character, so maybe more suitable form contemporary manipulation. This is something that differs to some extent from other historical buildings.
- The evidence of aging and decaying are common signs of the past that are commonly used in redesign projects to signal the history of the place and its narrative.
- Functional transformation of an industrial structure partially confront the idea of historic preservation, but still, there is room for both – presentation of history and sustainable reuse.

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REGAINING THE CITY - IDEAS AND INTERVENTIONS IN URBAN PUBLIC SPACES

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ABSTRACT

Public spaces are the structural elements of any architectural environment, areas of social cohesion, spaces of coexistence, outbreaks of urbanity programmatically designed to attract all types of public, to reunite the citizens of the city and to improve the dynamics of the urban space; in one word, the city's front window. The quality of urban space is primarily determined by the quality of the public areas belonging to the city, the areas that the city offers for common use to its inhabitants.

Architecture and reason usually go together: we build for a specific purpose, for specific functions; we use materials and methods that are directly related to the situations in which we need to interfere in; we calculate, anticipate, and ensure as much as possible that our interventions in the public space will be used in the way that we have imagined. But what would happen if we did not have these motivations? If we would only build to change the image of the city, to renew the relationship between man and architecture. Can we rebuild so that we sublimate our present experience? This paper proposes an incursion that provides an answer to these actions: to build, to beautify, to regain, to experience, to plan, to perceive, to criticize, to program and to transform our relationship with architecture and the city. These actions, with their possible variations and associated ramifications, are the main directions or, rather, the effects of small landscape designs in the lost or forgotten spaces of the city.

Keywords: *urban space; public space; urban design; small landscape designs*

1. INTRODUCTION

„It's in human nature to surround himself with a world of his own. To build a shelter and to form a settlement. To shape the nature and to improve the environment built by previous generations. To establish boundaries, landmarks, structures, symbols." (Triscu, 1985, 15)

The city does not represent only the anthropic landscape, but also heritage, tradition, culture, quotidian, sounds, light and darkness, vegetal, air, man, water, sky, all of them assembling in spaces and landscapes which are in a constant motion and evolution; the landscape that we perceive in a conscious or unconscious way. The city is a wide phenomenon with complex landscape manifestations, difficult to get to know and to influence inside the gear mechanisms and urban forces. The city can be understood as a wave of zones and subzones, with its own strategic awareness of urban definition in relation to its inhabitants, but also with the external forces considered to be structural elements. (Grigorovschi&Răchieru, 2011 , p.54)

Within a city, a positive and a negative space can be noticed (Ashihara Y., 1970). The positive space is the built environment, the outside space being the negative one. But, as Yoshinonu claims, the unbuilt space is not a negative pattern of the built space. It can be positive because it determines the built one, representing at the same time an essential element of the urban landscape. Therefore, the unbuilt space is organic, homogenous, consistent, representative, and not just a simple companion or an envelope to the building. It contributes to a better quality of life for its users, mostly defining the urban image. The unbuilt space offers room for movement, communication, and meetings and, when such functions and their circumstances are treated unitarily, the ensemble becomes cohesive and takes part in shaping the personality of the city and its inhabitants (Trișcu A., 1985, p. 33).

Public spaces are the structural elements of any built framework, spaces of social cohesion, areas of coexistence and of urban outbreaks, designed to attract all types of audience, to bring together all citizens and to boost the city's urban area; shortly, the showcase of the city. The image of the city and, therefore the definition of life's quality, depend largely on public spaces which occupy a major and heteromorphic role.

Between spatial compliance and the needs of the inhabitants, a question arises: must the city be changed in order to change the quality of life or vice versa? However, the two processes follow and mould each other. By now, the history of cities has shown that spatial transformation accompanies spatial evolution and vice versa.

Specific places constructed or landscape designed, natural, or artificial, the public spaces of a city have, depending on their players, different meanings. Thus, the practitioners of built space (architects, planners, geographers, engineers, and landscape architects) approach these urban and architectural fragments as trump cards of a city, as major structural basic elements of a built environment. For residents and users, the public space of the cities represents meeting places, landmarks, which plays a major role in the social cohesion of the individual. Historians, sociologists, environmentalists are oriented on the information and messages that these spaces send, facts regarding the history, culture, mentality and the level of economic and technological development, the quality of life and the values that define society over time. (Țurlea, 2008, p.5)

The quality of the urban spaces is determined primarily by the quality of the public spaces corresponding to the city, the spaces that the city offers to common use for the inhabitants. Therefore, for a public space the number of users and the approach of the public space to the public, in terms of using that space, but also of its recognition as a landmark of a place, a neighbourhood or a city, are important. The most important aspect of urban life in the present time is the practicability of the city, its endurance as a public space. When we think of public space, we are not talking about *the agora*, the ancient meaning, of this urban space, a concept that cannot be revived, but that can be rehabilitated according to the needs of contemporary man. Increasing the attractiveness of public spaces in the current conditions relies on quality, vitality, and security.

2. MOTIVATION

Architecture and reason usually go together: we build for a specific purpose, for specific functions; we use materials and methods that are directly related to the situations in which we need to interfere in; we calculate, anticipate, and ensure as much as possible that our interventions in the public space will be used in the way that we have imagined. But what would happen if we didn't have these motivations? If we would only build to change the image of the city, to renew the relationship between man and architecture. Can we rebuild so that we sublimate our present experience? This paper proposes an incursion that provides an answer to these actions: to build, to beautify, to regain, to experience, to plan, to perceive, to criticize, to program and to transform our relationship with architecture and the city. These actions, with their possible variations and associated ramifications, are the main directions or, rather, the interactions of small landscape designs in the lost or forgotten spaces of the city.

The brain and the eye function in the way they see things so that these have a meaning in the past, accumulated experience. A limited amount of information is generally sufficient to reconstruct the whole and the impression of a continuous vision. The eye, unable to fix its attention on several objects, automatically regroups different elements of the ensemble by examining them according to similarity. Too much diversity causes an indecision of the gaze, a source of dispersal of interest and unconscious dissatisfaction. There is therefore a need for an optimal threshold of diversity. Moreover, the urban space must offer the possibility of spotting, allowing the spectator's orientation and inducing a sense of security.

The city is the living space of the contemporary individual, and yet the way cities are being planned, are growing and being destroyed seems to be outside the manifestations and sensibilities of citizens: many of the places we pass have become inappropriate because the city has lost its symbolic character and, as a consequence of globalization, it has also lost its identity. We wonder if recovering these abandoned spaces through small interventions can combine these diseases of our modern cities and can open the gates of expectations that address an understanding of the city as a human scene, where public spaces, natural spaces and landscape are the elements that complete it.

The aesthetics of landscaping has beneficial influences on the culture and artistic education of the population and on its morale. From a material perspective, an aesthetically representative city exerts a great power of attraction on travellers and tourists which attracted by public spaces.

3. DESIGN TASK

As in other cities in Romania, the urban texture of Iasi comprises a multitude of abandoned public spaces, undeveloped, unmaintained, deconstructed which besides the poor quality of the urban image and lack of urban public, can become unsafe for the public.

The mini-park (also known as the "pocket-garden" or mini-garden) is a small park accessible to general public. They are frequently created on small, flat, or irregularly surveyed land areas that belong to the public domain. They can also be created as a component of the public space requirement for large real estate development projects. These types of landscaping can be present both in urban public space, but also in suburban or rural, and can be arranged not only in the public domain. Although too small to allow for physical activity, the mini-parks offer an oasis of greenery in the public space, a place to spend time outdoors, and sometimes a playground for children. Often, they are created around a public forum monument or an art object.

In heavily urbanized areas, especially in the city centre, where the price of land is very high, mini-parks are the main option for creating new public spaces without a large-scale redevelopment. Inside the city, such mini-parks are often part of urban regeneration plans.

Over time, together with 5th year students from the Faculty of Architecture “G.M. Cantacuzino” Iași, we tried to propose a series of small landscape designs that would add quality to the urban environment, favour social contact and at the same time generate a new, more appropriate urban image of unused and abandoned spaces. In principle, the study focused on unused and undeveloped small public spaces: we aimed to identify these locations in the city of Iasi and transform them into small landscape designed spaces, into "mini-gardens. Particular attention was paid to pedestrian traffic spaces and those located in their immediate vicinity, small, unused, with a predominantly mineral structure and constituent elements (fronts, fences, floors, buildings, etc.) lacking special spatial-volumetric, architectural, and plastic qualities, or even completely destructured public spaces.

4. RESULTS

The study was carried out in several stages. The first phase involved identifying, studying and multi-criteria analysis of the areas. The analysis criteria of the public spaces used by students were established because of a previous study conducted at the Landscape discipline. In the second phase of the project solutions to revive the urban deconstructed areas were proposed.

Figure 1: Landscape design proposals in Iasi: the crossroad between Sf. Lazarus street and the esplanade of the Faculty of Constructions

The obtained mini-parks (Fig.1, Fig. 2, Fig. 3, Fig. 4, Fig. 5) are developed on small areas and most of them use vegetal elements for arrangement, the presence of mineral elements (benches, small fountains, works of art, architectural installations, billboards, floors with different textures and colours, etc.) being minimal. Also noteworthy is the versatility of these gardens, the proposed landscaping solutions being possible to be multiplied and adapted to allow their use throughout the city.

The quality of the arrangement was emphasized, so that it favours human contact, socializing , rest, etc. These arrangements were aimed to become a living, multifunctional, attractive, public space, accessible to everybody.

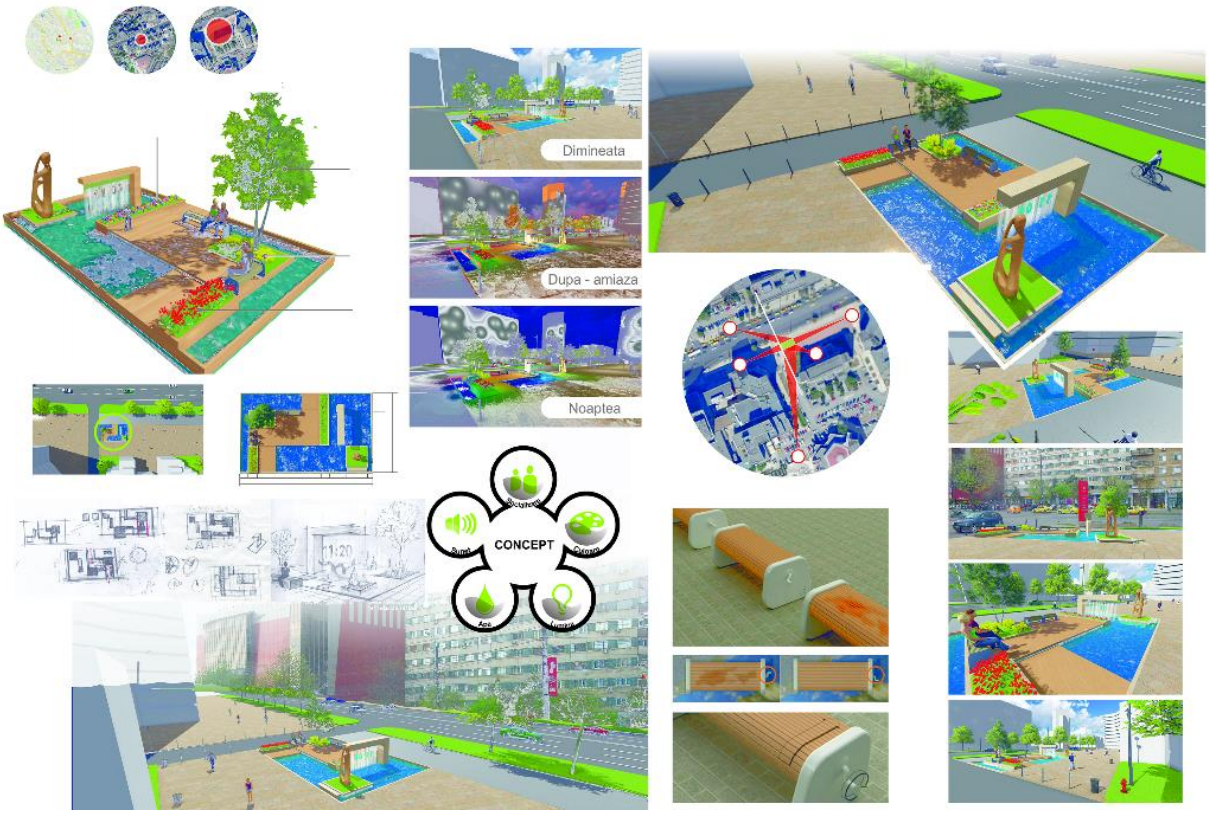

Figure 2: Landscape design proposals in Iasi: Anastasius Panu street

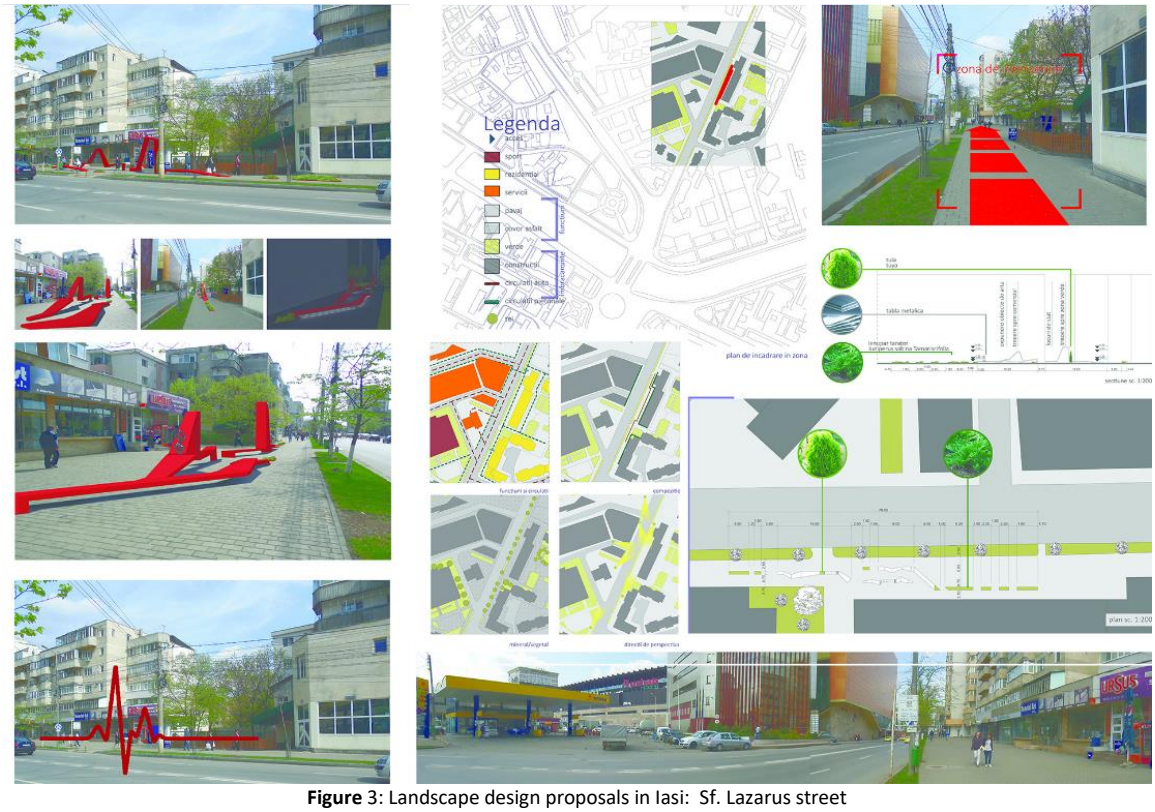

Figure 3: Landscape design proposals in Iasi: Sf. Lazarus street

Figure 4: Landscape proposal in Iasi: crossroad between Independence Blvd. with Alexandru Lapusneanu street

Figure 5: Landscape proposal in Iasi: Podu Ros

The proposed designs for the 'mini-parks' meet the following urban goals: usage of local, natural, sustainable and high quality materials; usage of local plant species adapted to the urban environment, without expansion and space invasion trend; developing pavements which allow water draining; developing an efficient lighting system, adapted to ensure space safety; realizing a low cost landscape design; compliance planning in respect with the spirit of the place and in accordance with the specific area and the city; creating a space that allows the urban space to be restored by vegetal elements, relating to the urban mineral.

5. CONCLUSION

The city, although a coherent whole, appears as a complicated agglomeration in a continuous transformation.

Landscape designs in the city must meet the following conditions in order to fulfil the essential purpose of raising the quality of life of the human settlement residents:

a) to be equally through the city;
b) to be qualitative;
c) to be accessible to all residents and city visitors.

If these conditions are satisfied, urban landscape design will have a social, economic and ecological impact contributing to increase the urban comfort.

The image of the city and, implicitly, the definition of the quality of life, largely depend on the public space, which plays a major and polymorphic role. As Richard Rogers stated in the preface to Jan Gehl's book,

'cities - like books - can be read […]; the street, the alley, the square and the park are the urban grammar; they make up the structure that allows cities to come to life, encourage and host various activities, from quiet and contemplative to noisy and hectic. A human city - with carefully designed streets, squares and parks - offers pleasure to visitors and passers-by, as well as to those who live, work or play there every day.' (Gehl, 2012)

Therefore, we tried through our approach to emphasize the fact that, through small interventions on a micro scale, they can bring a plus of quality to the urban environment, by recovering some unused and abandoned spaces, ignored, and neglected.

ACKNOWLEDGEMENT

I would like to address king regards to the following students and former students: Andronachi Alexandra, Cărăbuș Andreea, Șerbănoiu Georgiana, Bălan Alexandru, Cojocaru Alexandra, Profiri Anca, Neculau Manuela, Gontariu Miruna, Știfiuc Ekaterina

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THE WORSHIP SPACE AS AN IN-BETWEEN PLACE

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ABSTRACT

Traditionally, religion and religious practices in all their forms have raised questions and answers about the meaning and significance of human existence, at the same time alleviating man's feelings of isolation and alienation. In this sense, they appear to be intrinsic to man's history, to his inner equilibrium, to his attempt to find his own place in the world. Just as religious representations, texts and practices are elements of the mediation between the people and the knowledge they seek, or between themselves and the gods they worship, sacred architecture assumes through symbolic materialization, the same mission. In this context, analogous to scripture, prayer, worship, sacred persons, oracles, shamans, and other mediators, the sacred place was an intermediate area, giving it the power to unite, open, and reveal. Sacred architecture plays a critical role in the embodiment of religious symbols and the promotion of common rituals - in order to create a middle territory, a liminal space, an intermedium, a mediator between man and what he seeks, adores, worships or fears. The contemporary society, a space of cultural, economic, and political transformations, influences, to a strikingly degree, the relationship of the contemporary individual with the sacred space. More or less aware, the contemporary individual displays the need for the sacred in various manners, occasionally, very subtle. Architecture, on mentally and physically level, playing a highly important role in delimitating the sacred in the contemporary world.

Keywords: *church architecture; religious symbols; sacred space; transcendence; worship space*

1. INTRODUCTION

Along history, people have worshiped deity and brought sacrifices in specially chosen places. The Assyrians and the Babylonians worshiped Gods on plains, Persians worshiped their gods on high plateaus, Geto-Dacians on mountain peaks and ancient Celts in shady forests, in caves and near water springs. Later, shrines (sanctuaries) were built and after that specifically intended buildings for worshiping, existing among all the ancient peoples and religions, in various forms and names: temples, synagogues, churches, mosques, etc.

Regardless of religion, place and time, cult buildings are representative works for the entire history of architecture, and a Christian church is no exception. Lasting support of European culture and divided after 1054 into its two branches, Catholicism and Orthodoxy, in the first instance Christianity existed without owning its own places of worship. Raising up specific constructions began only after its recognition as the official religion of the Roman Empire, the Christian cult constructions becoming over almost two millennia, on the vast territories, a privileged program of architectural creation.

2. THE SACRED, MAN AND ARCHITECTURE IN CONTEMPORARY INTERPRETATIONS

'Architecture awakens frames of mind in people. The architect's duty is to specify these states of mind' (Adolf Loos in Melicson, 1975, p. 101), the object of architecture existing in the public space and underlining its place in the daily existence and in the psychology of the human being who contemplates it. However, the goal of architecture is not just a formal and aesthetic one, beauty existing only in relation to function. The place of worship has represented and continues to represent a theme of reflection and research that concerns theologians, architects, artists and thinkers, in an attempt to discern the place of the Church in the

contemporary world and the embodiment of its symbolism in the built space. This theme can be interpreted in different ways, because 'knowledge is unique, but people are different' [2].

2.1. Sacred Space Between Philosophical Discourse and Contemporary Reality

Émile Durkheim places society at the origin of the sacred. He defines religion as 'a compact system of beliefs and practices related to sacred things, that are isolated, forbidden; these beliefs and practices unite all those who adhere to them into a single moral community, called the Church' [13].

From another perspective, René Girard does not define the sacred, but places violence at its foundation, launching the hypothesis that

> 'the game of the sacred and the game of violence are one and the same. Ethnological thinking is undoubtedly willing to recognize the presence, within the sacred, of everything that can correspond to the term *violence*. However, in a hurry it will be noted that there is something else in the sacred, even something contrary to violence. In the sacred there are both order and disorder; peace, but also war; creation, but also destruction' [13].

According to Girard's theories, through the sacrifice of Jesus, Christianity breaks the sacrificial chain by replacing it with love, thus representing the end of the genesis of the sacred.

Using mainly the sacred-profane bipolarity, Roger Caillois, quoted by Julien Ries in *The Sacred in the Religious History of Mankind*, defines the sacred as a 'fundamental category of religious sensibility, which gives it a specific character (...) in its elementary form, the sacred represents first of all a dangerous, incomprehensible energy, difficult to handle, extremely effective' [13]. Caillois analyses the character of the sacred resulting from the pure-impure opposition (nurturing sacred - holiness, evil sacred - guile). The recreation and rejuvenation of the world are determined by the venerable sacred and the transgressive sacred. The venerable sacred, for the primitive societies represents the assurance of the integrity of the institutions, the violation of the holy laws of respect being seen as an act of desecration (incest, consuming the totem, killing a member of the clan, etc.). The transgressive sacred determines the recreation of society and the renewal of the world, the holiday being 'a remedy against wear and tear, a recreation of the world' [13]. Roger Caillois considers that the sacred opens two directions: the religious path, of mysticism and fanaticism, and the social path, of dogmas, rituals, and worship.

Regarding the study of religions, Juan Martin Velasco argues that in the study of the sacred the phenomenological method in relation to other types of scientific research is a method of interpreting the religious phenomenon that studies the sacred in all its aspects, seeking the essence of the phenomenon and discovering and understanding the structure of the religious fact[1] [15]. Starting from the multitude of its manifestations, the claim of totality tends towards the integral comprehension of all aspects of the religious fact. Different phenomena are determined by the same reality depending on the receiver, its intention and its availability of perception, so that by comparing different manifestations exactly that unchanged fact is discovered, being present in one form or another in any aspect of the phenomenon. Understanding of the religious fact requires not only a strictly objective approach of the researched subject, but also the cultivation of a capacity 'of communicating between the interpreter and the determined religious intention of the specific world in which all his manifestations are inscribed' [15]. Applying the phenomenological method in architectural theory is as important as applying it within the study of the sacred. Additionally, in the theory of architecture the phenomenological method has the richest implications on the sacred space.

Nathan Söderblom, one of the first researchers to apply the phenomenological method in the study of religions, considers the sacred 'a mysterious power or entity related to certain beings, things, events or actions' [13]. His studies, which are on the edge of philosophy and theology of religions, are the closest to what is currently the phenomenology of religions.

On the other hand, Rudolf Otto underlies his research on three major principles: the discovery of God is *apriority* and has nothing to do with experience; the realm of religion coincides with the ineffable realm of

[1] 'a method of interpretation of the religious fact characterized by the claim of totality - it studies the religious fact in all its aspects - and by the fact that it takes as a starting point in the interpretation all its possible manifestations throughout history. In addition, the phenomenological interpretation is characterized by the emphasis on the *comprehension* of the religious fact, an understanding that (...) refuses to explain it by reducing it to any other type of phenomenon.' (Velasco, 1997, p. 27)

mystery, and the only possible language to preserve the integrity of the mystery is the symbol. According to Otto,

> 'above all, the sacred is a category of interpretation and evaluation that exists, as such, only in the religious field. (...) It is a complex category and therefore it carries within itself an element of a completely different kind (...) and which, while remaining completely inaccessible to conceptual understanding (as is the case with beauty in a completely different domain), is an árrēton, something ineffable' [11].

Rudolf Otto calls this phenomenon using the term *numinos*, resulting from *numen*, a term that "first, will fix its special character and, secondly, will allow it to be notified and to indicate possible lower forms or stages of development" [11]. The characteristics of the *numinous* are: 'the feeling of the creature's state', *tremendum, mysterium, fascinans* and the colossal. 'The feeling of the creature that sinks into its own nothingness and loses itself in the front of what is above all' [11]. is the reaction provoked in consciousness by the *numinous* object. *Tremendum* is the mystical terror. *Mysterium* is 'the Stranger and the Amazing, is what is absolutely outside the realm of ordinary, intelligible and therefore *familiar*' [11] is that *ganz andere*, 'completely different', the element that produces *stupor* - an astonishment that freezes you, absolute amazement [11]. *Fascinans* is 'what often intensifies to delirium and drunkenness, which is the Dionysian aspect of the name' [11]), is something wonderful, intoxicating, disturbing, seductive; the Colossal is the unusual, the disturbing, which in Goethe's work designates both that which is very large in proportions and exceeds our capacity for spatial perception, and 'the monstrous-disturbing and the monstrous-abominable' [11]. Otto places the sacred in the category of *the sublime*, due to the characters of *tremendum, mysterium* and *fascinas*. Similar, P.A. Michelis places in generally religious architecture in the category of the *sublime*[2], and, particularly, Byzantine architecture.

Continuing the studies of his predecessors Söderblom, Otto and van der Leeuw, Mircea Eliade closely investigates the behaviour of the religious man and distinguishes two human types: *homo religiosus*[3] and the nonreligious man, called by Otto '*natural*'. In his view, the historian of religions must investigate religious facts in order to show what they reveal. Thus, he must explain the phenomenon of the permanence of forms throughout history. Eliade finds that the recurring tendency of man to return to the archetype is the secret of the experience and the continuity of divine forms. Starting from the archetype, he tries to find the transcendent in the human consciousness. Mircea Eliade's entire approach integrates three main directions: history[4], phenomenology[5] and hermeneutics[6]. (Eliade, 1994, pp. 23-24) He considers that any religious phenomenon is an act of the manifestation of the sacred, so, a *hierophany* [4].

The two elements on which Eliade's approach is based are the sacred-profane relationship and *hierophany*. The sacred-profane relationship is not a relationship of opposition, but of a particular cooperation between the two levels. The sacred is camouflaged in the profane, hence the important consequences of how to assign to a place the 'quality' of being sacred. Thus, he raises the idea of an inhomogeneous space, divided into two hypostases, the sacred and the profane. In its meaning, the profane space is homogeneous and neutral, while the sacred space is hidden from the human eye, being easily confused and imperceptible in the absence of a *hierophany*[7]; it is a self-contained existence and being revealed at some point to a chosen one (in this sense, we

[2] aesthetic category fundamentally different from *beauty*

[3] He believes in an absolute, sacred reality, and therefore he takes in a specific way of life in the world. The nonreligious man refuses any transcendence.

[4] The religious phenomenon is primarily a historical phenomenon, and any religious experience takes place in a well-defined historical-cultural context. The historical approach is absolutely necessary in reconstructing the evolution of religious forms and in understanding the social, economic, cultural and political context in which it developed. (Eliade, 1994, p. 38)

[5] Although the religious phenomenon cannot be understood outside its cultural and socio-economic context, religious experiences cannot be reduced to non-religious forms of behaviour, since the encounter of man with the sacred is a unique and personal experience. Religious facts, although they have a historical character, reveal a behaviour that far exceeds the historical ones. Eliade gives a new dimension to the phenomenological approach: 'the study of man not only as a historical being, but also as a living symbol.' (Eliade, 1994, p. 43) The phenomenological approach is extended beyond the limits of the historical manifestations of the behaviour of religious man. It is oriented towards a deepening of the meanings and articulations of this behaviour. (Eliade, 1994, p. 41)

[6] Phenomenology identifies and classifies the religious phenomenon according to a certain morphology and typology; hermeneutics aims at the exegesis of the religious phenomenon, its interpretation and ordering in a general perspective. In Eliade's view, hermeneutics demonstrates that any religion reveals the existence of the sacred. It has a transformative power: by revealing meanings it creates new values and releases a message that can change human behaviour. Man thus becomes in contact with the spiritual world.

[7] The sacred is revealed to man through objects or beings that acquire a double role, they continue to belong to the natural environment, but at the same time becoming something completely different. Hierophanies are made up of three elements: the object / being through

can find in the Old testament probatory passages: the one in which God appears to Jacob - in a dream at Bethel -, or to Moses in various forms, only in specially chosen places[8]), or, there is anywhere a potential for sacredness that can be activated (and cultivated, in the Heideggerian sense) through rituals and prayer (the sanctification of the place for the founding of a church). Traditionally, the establishment of a church was preceded by a ritual that revealed or commemorated the sacred. The ritual aimed at commemorating the gateway between the worlds, the element that maintains order and connection with the Divinity, a *hierophany*[9] or the consecration of a special event[10]. Therefore, 'if the revelation is a direct, immediate, and personal link to the Divinity, the power of the ritual of sanctification as a generator of sacred energies cannot be ruled out in any form' [10].

The sacred space can appear in one of two opposite situations: either it is discovered by a man who possesses special qualities and is sensitive to the special nature of the sacred, or it is revealed after a *hierophany*, through which the Divinity finds it appropriate to consecrate such place to make a connection with people [7]. It can have easily recognizable valences to its environment[11] or, most often, it can be completely hidden from the uninitiated, so that, once discovered, it is necessary to commemorate it by raising a monument. In most religions, the place of worship has a permanent and easily recognizable character, and by overlapping, it marks these natural elements and represents the next step in the worship of thr *hierophany*. Assimilated to the concept of *imago mundi*, the temple or sanctuary receives the role of re-foundation, of reiteration, people consecrating the sacred through ritual, summoning and orientation. The temple is considered by the great Eastern civilizations, by Jews and then by Christians, as having a greater role than that of *imago mundi*; it is 'an earthly reproduction of a transcendent model […] a copy of a heavenly archetype' [4], the image of the Heavenly Jerusalem.

Religious architecture aims at encompassing the incomprehensible within limits. The primary element with which religious architecture operates is the symbol, and the symbolic structure is specific to *hierophany*. Thus, it can be stated that the symbol and the *hierophany* represent the form, respectively the content of the same manifestation of the sacred. In an analogous way, the type of mediation present in a *hierophany* is similar to that in which, in architecture, bringing together different elements of a physical nature invests the whole created with sacredness, the space becoming sacred, consecrated.[12] So the sacred space is a mediating space for the relationship with the Divinity, in which the Divinity is not only contained and seen, but sees, in turn, man. The mediation generate a series of consequences: the Mystery incarnates, descends into the world and participates in it; through its entry into the world, the Mystery enters the history of man, the sacred thus receiving a social dimension. The descent of the sacred into the world gives it a certain ambiguity, due to its double nature: it belongs to both terrestrial and transcendent, this ambivalence being evident especially in the sacred space. It is located simultaneously in both levels and participates in the configuration of the two worlds.

If Mircea Eliade bases his theories on the manifestation of the sacred as *hierophany* [4], a fundamentally symbolic form, by appearing in one of the forms of existence, Gerardus van der Leeuw [4], introduces *kratophany*, the theory of the manifestation of the sacred as magical power, by intervening in the natural, profane order. Events of an individual religious expression, *hierophany*, through the religious symbol, generates myth and later dogma, and *kratophany*, through magical thinking, gives rise to ritual and then worship. The religious symbol and the magical thinking are meeting places of the individual and the community, the myth and the ritual being hypostases of the collective religious attitude.

The configuration of sacred architecture is influenced by two types of expression of religious attitude: at the level of action through ritual and worship; in the spiritual level, through myth and dogma. Religious dogmas not

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which the sacred manifests (remains in its natural environment), the transcendent reality to which the object and the mediator: the object / being that acquires a new dimension - sacredness.

[8] these spaces then remain sacred in the Jewish tradition precisely through the prism of divine revelation

[9] such as that of the dream of Jacob who sees the Gate of Heaven in a place called Bethel

[10] such as the case of the monasteries of the Moldavian ruler Stephen the Great, built on the site of his victories against the invaders

[11] the height of a ridge, the connection it makes with the sky - "axis mundi", a break in the continuity of a space, the clearing in the middle of a thicket of forest

[12] The sacred-profane distinction belongs mainly to the modern world. In Christianity, where the whole world is sacred, but has degrees of sacralization, the right distinction is between what is consecrated and what is not consecrated.

only influence, but decisively determine the structure and composition of a place of worship, even if it is most often defined by reference to worship and the conduct of the ritual. The space of worship is in fact the transposition into a constructed form of the dogmas on which the faith is based.

2.2. From Creator to Receiver. Passing on the Message through Architecture

In the 1960s, the linguistic paradigm transcended the territory of language, being taken over in both sciences and visual arts. Structuralism goes beyond the limits of philosophy, becoming itself a method which, based on analogies with verbalized language, analyses all the processes that take place in the surrounding reality, looking in language for structuring models and particularities of meanings. The perception of each product or cultural phenomenon as a language in itself, and as a result, the interpretation of any fact in terms of a process of meaning and communication, is one of the first consequences of the spread of the linguistic paradigm.

Umberto Eco defines the communication process as 'the passage of a Signal (which does not necessarily mean '*a sign*') from a Source, using a Transmitter, through a Channel, to a Recipient (or destination point)" [3]. In his study *The Absent Structure*[13] in the chapter on architecture, *Architecture and communication*[14], Umberto Eco defines semiology as

> 'not only the science of sign systems recognized as such, but the science that studies all cultural phenomena as if they were sign systems - based on the assumption that in reality all cultural phenomena are systems of signs, and therefore that the whole culture is essentially communication' [3].

The author foresees the challenge of architecture[15], by demonstrating from a semiotic perspective the fact that

> 'in the architectural signs *descriptive* and *catalogable signifiers* can be recognized and that can denote precise functions, provided they are interpreted according to precise codes; and they may be loaded with successive meanings, which may be assigned (...) not only by way of denotation, but also by way of connotation, based on other codes' [3].

So the architectural object can be defined as a composed sign of functional denotations and symbolic connotations. Eco investigates the relationship between function and form, interpreting the modernist saying 'form follows function' and arguing that 'the shape of the object must not only make function possible, but must denote it so clearly that beyond being easily legible, it may be desirable. […] A new form cannot be functional *if it does not rely on existing coding processes*' [3]. In other words, form denotes function only based on a code.

Umberto Eco proposes a reading grid that has certain limitations due primarily to the fact that the linguistic paradigm cannot be fully applied to the architectural phenomenon, but in which certain points can be identified that prove themselves being useful in researching the place of worship, where the role of codification processes and interpretation codes is essential: in architecture one operates with functional denotations and symbolic connotations; in the relationship between form and function, a new form cannot be functional without relying on existing coding processes; the architectural message results from a dialectics between significant forms and codes of interpretation.

Following this reading grid, a large part of the failures of contemporary attempts to renew religious architecture can be explained by the fact that they simultaneously proposed new forms and new codification processes. For the place of worship, the codification processes and codes of interpretation play a fundamental role. Unlike civil architecture, in which reformation is more easily accepted, in the religious architecture changes are much more difficult to understand and accept. Here, both the coding process and the code of interpretation must be primarily validated from a dogmatic point of view. Codification requires several stages, the whole process demanding the establishment of landmarks validated and accepted by both the Church and architects, the removal of elements perpetuated in time by mechanical reproduction, and finally, the (re)configuration of formal elements. These steps need a sufficiently long-time frame so that a good understanding and assimilation of the coding process can be ensured.

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[13] La struttura assente

[14] in Architettura e comunicazione

[15] "Architectural objects do not seem to communicate (or at least are not designed to communicate), but function" [3]

3. THE SACRED SPACE AND THE MEDIATING ROLE OF ARCHITECTURE

Significant places in contemporary urban environments can be better perceived and understood by knowing certain aspects of sacred architecture. In this sense, the role of mediator of sacred architecture and, in particular, its traditional role as a space of connection in-between worlds, of establishing a connection with the transcendent, a response given to the aspiration to fulfilment of man has always been neglected.

Alberto Perez-Gomez argues that 'regardless of culture, age, wealth and social status, people feel a sense of unfulfillment', a feeling that is also 'a gift', and 'throughout our lives we always look for *something*, something that we lack and that can contribute to our own perfection' [12]. The root of the word religion is the Latin '*re-ligio*', which suggests by its own meaning, 'to bind', 'to reconnect', the primary role of religion to connect and complete. In many religious traditions of the world there is constantly found the belief that a deeper connection of existence in the world is possible only through faith and religious participation, and the sacred is the whole, the instrument of reconnecting people with their god(s).

Religious beliefs and practices around the world, in all their diversity, share the same goal, to connect the individual to a broad common cultural and spiritual context, in which religion is a mediator, through its practices uniting the individual and the community, people and gods [1].

Traditionally, religion and religious practices, in all their forms, have posed questions and answers about the meaning and significance of human existence, while alleviating human feelings of isolation and alienation. In this sense, they appear to be intrinsic to man's history, to his inner balance, to his attempt to find his own place in the world. Religious architecture aims at the same objectives – putting in significant places with a symbolic content, raised in chosen, consecrated places, with the belief that this will open the way between the two worlds. Just as religious representations, texts and practices are elements of mediation between people and the knowledge they seek or between themselves and the gods they worship, sacred architecture assumes the same mission through symbolic materializations. In this context, analogous to scripture, prayer, worship, saints, oracles, shamans, and other intercessors, the sacred place was an intermediate area, with the power to unite, open, and reveal. Sacred architecture has played a critical role in embodying religious symbols and promoting common rituals - in order to create a middle ground, a liminal, intermediate, mediating space between man and what he seeks, worships or fears [1].

Sacred architecture commonly uses a variety of methods to establish a place that is both separate and connected to its context. These include: a clear delimitation of space, articulating a sequential path, untangling the place by geometry and proportions and the use of various symbolic motifs. Delimitating often represents the primary task of the sacred spaces - the in-between areas which distinguish the sacred places from the profane ones. From the radial arrangement of some stones to elaborate ensembles, the marking of a place in order to differentiate it from others can be understood as a fundamental human and architectural act.

The access, the path and the thresholds participate in the clear delimitation of the sacred space. In addition, ordering the sacred space meant, in some cases, creating a *perfect world* that symbolized the perfection of the divine, while providing a space in which the God *to live*. Moreover, the texture of the surfaces and a series of scenographic and epigraphic elements contributed to the creation of an architectural cosmogram subordinated to its own symbolism.

In traditional ritual activities, participants play liminal roles between sacred and profane, between present and past and the divinity worshiped by them. This sacred time of the sacred space is a symbol of a bridge to the divinity and is often considered to be a forespeaker of transcendental experiences. Moreover, the depth of the rituals is influenced by the context of their performance, otherwise they lose their strength and risk becoming meaningless.

Whether it is a temporary altar, an opening in the forest or a huge temple, the sacred place offers the scene of the ritual. So, it becomes a place of passage to divinity. Sacred places are usually animated places, exhilarated by the faith of the presence of the divinity, their dynamism and vitality being deepened through ritual activities. The place of worship is considered to be the receptacle of the presence of the divinity and the place of reception and hosting of its own creators, its main purpose being to mediate man's encounter with the divinity.

Sacred architecture constantly requires the presence of man and ritual. In the absence of man and the cultic ritual, it does not exist, these being the forces that animate the space and articulate the meaning. Rituals are mediators of the transition from one way of being to another. Religious constructions protect those for whom

they were built, being the conducive framework to the development of individual and common ritual, and mediating the transformation in which they hope. In conclusion, their place of worship, ritual and synergy create what is considered to be a breakthrough of the sacred in the terrestrial world. Through place and action - scenography and ritual - participation and faith - this liminal place promises to establish a connection with the divinity.

An important aspect of architecture is its role as a cultural artifact that responds to the social, political, economic, and ecological context, and that expresses a complex matrix of cultural requirements and beliefs. But 'what is the book for education, architecture is for culture as a whole' [16] and, like other arts, it speaks many languages and dialects. Architecture currently expresses the place and the role of its creator in the world, and thus, be perceived as a form of communication.

Bernard Tschumi argues that architecture can be considered a 'form of knowledge' [14]. Traditionally, sacred architecture communicates using a varied spatial language. Through form, scale and location, the object of religious architecture transmits the symbolic/formal messages that highlight the significance of the sacred place. In its most significant examples, the architecture of the sacred space reveals its didactic and pedagogical role, as well as its own capacity to educate, influence and transform its users, in this context, showing its ontological significance, its role in increasing spiritual development of the human being.

Symbolic representation is just one of the means used to communicate content and induce certain feelings. Different sensory and particular psychological feelings are often generated by the atmosphere and the sacred setting, in accordance with the symbolic plan. Any space has sensory effects and can induce feelings of discomfort or relaxation, anxiety, or peace. The alternation of light and dark intensifies the experience of the course. By modulating the quality of light and finding the gradual relationship between light and darkness in space, the architect can create atmospheres of peace and mystery, conducive to the deep experience of the presence of the sacred. Similarly, the shape, dimensions and scale of the spaces and elements that define it can make the believer feel the greatness of the divine work and the need to detach and purify, through it, even for a moment, from the shadows of the world.

Architecture still has the quality of integrating and transmitting symbolic meanings. In this sense, the symbols can be further reinterpreted and repositioned in contemporary forms. Only through the symbol man can make the unknown "visible" and can structure his interpretations, in this context, architecture maintaining its ability to absorb, elucidate and inspire.

'Architecture, more than any other form of art, absorbs the immediate character of our perceptions. The passage of time, light, shadow, and transparency; colour, shape, texture, material and detail, all participate in the complete experience of architecture ... only architecture can simultaneously awaken all the senses - all the complicities of perception' [6].

4. CONCLUSION

We live in a world that has partially lost its ability to understand and appreciate the immeasurable. The Orthodox religion (a religion that produced one of the most significant sacred architectures in the world) may have lost its privileged position over time (especially in the Western world), but not the breath of living in the faith of salvation. This is not surprising given that, despite all the advances of knowledge and communication, man remains a vulnerable being; for him, his own life and death continues to keep an impenetrable mystery. Man seeks to represent and make his unknown accessible, through symbolism. It has proven to be essential to the religious beliefs of archaic societies and retains its function and value in today's architectural language. It is known that, in general, 'the creation of a work of art sheds light on the mystery of humanity' Ralph Waldo Emerson în [1], and architecture, especially sacred architecture, seeks answers, along with other arts, to questions about its existence and meaning.

The place of worship is the meeting place of heaven and earth, the intermediary of communication between man and divinity, the ladder of Jacob on the steps of which angels and saints descend to earth, and men ascend to heaven, all uniting in a single choir of God's magnification. In its architectural and pictorial ensemble, the church renders a sensitive vision or image of the heavenly Church, of the 'heaven on earth'. Through its own architecture, dominated by the cross plan and the dome of the Pantocrator, rounded above it like the vault of heaven above the earth, and through the interior painting, 'the church is meant to bring us closer to heaven, to make the Bible alive, to glimpse God, to intuit His presence' [5].

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THE POTENTIALS OF WINE REGIONS FOR THE FORMATION OF CULTURAL LANDSCAPES: EUROPEAN EXPERIENCES

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ABSTRACT

Sustainability has become increasingly important in recent years through the development, preservation, and protection of cultural and natural heritage and its promotion through activities of many world organizations. Today, the cultural landscape is a significant part of the world's cultural heritage, and it appears as the opposite of natural landscapes due to their variability with human activities. Considering the criteria defined by UNESCO for the categorization of a certain area of exceptional natural and cultural characteristics as a cultural landscape, the paper explores the potentials that wine regions have for this. Wine regions appear throughout Europe as one of the emerging forms of cultural landscapes, primarily due to the geographical characteristics and terroir concepts that accompany these areas. The interweaving between wineries as man-made structures, on the one hand, and vineyards, as an arranged natural element on the other, sets strong foundations for a mutual connection, and their togetherness forms the cultural landscape of the place where they are located. Examining the physical and natural characteristics that can be related to the potential of wine regions, the paper analyzes parameters such as physiography, climatic characteristics, soil, the existence of wine cellars, wine production, the architecture of the winery, etc. This paper aims to determine the common characteristics of wine landscapes that are accepted as cultural landscapes across Europe.

Keywords: *cultural landscape; UNESCO; wine region; wine cultural landscape; terroir; Europe;*

1. INTRODUCTION

Contemporary strategies of spatial and urban planning inevitably integrate numerous landscapes of exceptional values that surround us and for which Special Purpose Plans are often made. Various specifics and phenomena of origins characterize these landscapes. They have evolved over the centuries, resist, or are slightly transformed under the influence of numerous economic, cultural, and environmental factors that

accompany social development. Trends of globalization and technological progress have greatly changed our relationship with the environment and available natural resources and biodiversity, so the need for a more sustainable way of managing and protecting landscapes is becoming more pronounced. Although defined differently, according to the 2000 European Convention, a landscape is "an area, as seen by the population, and whose character is the result of actions and interactions of natural and/or cultural factors" (Council of Europe, 2000). Since the 19th century, there have been numerous initiatives to advocate for the institutional protection of landscapes, but the European Landscape Convention is the first document to further define the promotion, management, and planning of landscapes considered as a common European heritage. This document prescribes measures (general and special) by which it is necessary to recognize areas that have landscape qualities at the national level, monitor their changes, and integrate landscapes into planning, cultural, agricultural, social, economic, and environmental policies, all with cooperation and dialogue with other members of the Council of Europe. In this way, the Convention practically promotes a holistic approach to landscapes, not separating protected natural and cultural assets from other areas (and those degraded), but also seeks to preserve the regional diversity of landscapes (Vasiljević and Radić, 2016).

The landscape that has been changed by human activities is more closely defined through the concept of the so-called *cultural landscape*. The term was first used by the geographer Otto Schülter at the end of the 19th century, who recognized the cultural landscape, unlike the natural one, which was not greatly influenced by man, as an area created by direct human influence (James and Martin, 2005). At the same time, there was another interpretation of Carl Sauer, a prominent American geographer, according to whom a cultural landscape is created under the influence of culture or cultural group, where culture is an agent, natural environment a mediator, and landscape the final result (Fleming, 2015). In December 1992, cultural landscape concepts have been recognized by the World Heritage Committee as a category of the site in the World Heritage Convention's operational guidelines (Samsudin and Maliki, 2015). Cultural landscapes often reflect a variety of land uses sustainably, using available environmental resources, and need to be protected because modern land uses often marginalize their natural features. Besides, the value of the cultural landscape is based primarily on authenticity and autochthony, biological and geological diversity, preservation, the richness of natural phenomena and processes, and sustainable development in a global context (Jovanović-Ilić, 2017).

Given the expansion of winemaking and wine architecture in the 21st century, wine tourism that has developed as a new sustainable concept around the wine industry, as well as global wine marketing as the prestige of society, our research examines wine regions and their potential for cultural landscapes. Wine regions throughout Italy, Spain, France, and other parts of Europe and the world, today attract a large number of visitors who want to enjoy not only quality wines but also performances that accompany their production in prominent contemporary design facilities or authentic wine cellar spaces, as well as the surrounding vineyards. Given that a small number of wine regions have been included in the World Heritage list to date, the paper aims to examine the characteristics and values of wine regions that qualify them for cultural landscapes of exceptional importance. In this regard, the research is based partly on a comparative analysis of officially recognized wine cultural landscapes: terroirs of Burgundy in France, Tokaj region in Hungary, Vineyard Landscape of Piedmont in Italy, and Aldo Douro Wine Region in Portugal. The comparative analysis takes into account several factors that are recognized as an integral element of wine cultural landscapes: natural factors-terroir vineyards (soil, climate,...) and cultural-artificial factors-wine production process, the architecture of wine cellars and wineries. Referring to the methodological criteria framework of UNESCO for qualifying an area as a cultural landscape, the paper aims to point out which potentials of wine regions are crucial for the formation of cultural landscapes.

2. THE FRAMEWORK OF UNESCO'S CULTURAL LANDSCAPE APPROACH

Cultural landscape (along with Historic Towns and Town Centers, Heritage Canals, and Heritage Routes) has been identified as a specific category of cultural and natural heritage and is defined according to the UNESCO World Heritage Committee as a landscape of specific combined actions of nature and man. In modern times, these landscapes are a record of the past and evolution of human civilization and settlements over time under various sociological, economic, environmental, and cultural influences. In 1992, The World Heritage Convention became the first international legislative document to recognize the category of cultural landscapes as part of the heritage and set guidelines for its protection and management. At the same time, it since then it is possible to include these areas on the World Heritage List. According to paragraph 46 of the basic document defining the Cultural Landscape and its management, "*Operational Guidelines for the implementation of the World Heritage Convention*" of 8 July 2015 (supplement to the original documents from 2002, 2005, and 2008),

the cultural landscape is recognized as “mixed cultural and natural heritage”. Namely, unlike cultural and natural assets, the cultural landscape represents their synergy, so in the process of inclusion on the World Heritage List, it is necessary to fulfill the extraordinary values of both categories. According to UNESCO, to date, 114 properties with 5 transboundary properties (1 delisted property) on the World Heritage List have been included as cultural landscapes [1].

There are three different types of cultural landscapes (Operational Guidelines, 2015, Annex 3):

- landscapes designed and created intentionally by man (different types of gardens, vineyards and other rural landscapes, squares, parklands close to castles, villas, monasteries or other monumental buildings),
- organically evolved landscapes which reflect the process of evolution in their form and features (relict landscapes-when an evolutionary process came to an end at some time in the past; the vernacular landscape-when landscape is associated with the traditional way of life while the evolutionary process is still in progress),
- associative cultural landscape (indicates the powerful influence of religion, culture, or nature-for example industrial complexes, areas of importance for the history of the country, or related to war events, beliefs, and cults).

In the process of including an asset on the World Heritage List, there are certain criteria for the assessment of Outstanding Universal Value. Table 1 provides an overview of ten criteria that also apply to cultural landscapes. Landscapes nominated under criteria (*i)* to (*vi)* must possess authenticity as a basic characteristic, and also integrity is of great importance. The mentioned ten criteria are also a part of Annex 2a of the provisional list - application format (Tentative list submission format) which is in the mentioned document "Operational guidelines". Six of the ten mentioned criteria are listed as elements of a ten-year analysis of cultural heritage - cultural landscapes (1992-2002) (Folwer, 2003). The first six criteria are related to man-made values, while (vii) to (x) criteria are related to the natural values of an area. The practice of declaring a cultural landscape is often applied if they possess one or more characteristics of both groups of criteria.

Table 1: World Heritage Criteria for Cultural Landscapes (taken from the Operational Guidelines for the Implementation of the World Heritage Convention, paragraph 77)

Criterion number	*Criterion description*
i	*represent a masterpiece of human creative genius*
ii	*exhibit an important interchange of human values, over some time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design*
iii	*bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared*
iv	*be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history*
v	*be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change*
vi	*be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance*
vii	*contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance*
viii	*be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features*
ix	*be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, freshwater, coastal, and marine ecosystems and communities of plants and animals*
x	*contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of Outstanding Universal Value from science or conservation*

3. COMPARATIVE ANALYSIS OF WINE CULTURAL LANDSCAPES IN EUROPE

In recent years, the wine cultural landscape has been increasingly mentioned as a natural-cultural phenomenon in the area of exceptional characteristics related to the branch of viticulture and winemaking.

[1]The data is taken from the official website of the UNESCO https://whc.unesco.org/en/culturallandscape/ (accessed 15 Septembar 2020)

Wine cultural landscapes are developing throughout wine regions and represent landscapes formed by humans while creating a natural environment through the use of land for growing vines and an artificial environment by building facilities for wine production in the traditional rural spirit (Virtuani and Zucchella, 2008). These landscapes are defined by factors that this research can be seen as natural and cultural. Natural factors are based on the concept of *terroir* (Leeuwen and Seguin, 2006). This concept, developed in the scientific framework dealing with viticulture, represents the connection of wine with the environment and encompasses all the parameters that define a climate where the vine is grown. Terroir methodology, derived from the French words *territorie* and *terre*, is a concept that combines several influencing environmental factors such as climate, soil composition, terrain topography, context, and nearby materials, which are closely related to vineyards and winery facilities (Brink, 2009). Further, Jacobsen (2010) defines terroir as a sense of place, which indicates the unique characteristics of the local environment to produce certain qualities of the product a "taste of place." And while the microclimatic conditions should provide optimal sunshine of the vineyards, for the development of vines, the composition of the soil directly affects the quality of the wine. Cultural factors, on the other hand, concern the change of the environment in the physical sense by man, and in winemaking, they refer to the construction of space for storing and producing wine. In wine cultural landscapes, these spaces are recognized as wine cellars, which are often buried and once built in the existing natural environment excavated by rocky hilly areas. The architecture of the cellar and other wine storage facilities, the applied materials, the form, and the integration into the environment largely determine the identity of the cultural landscape.

The comparative analysis includes four wine regions that have been recognized by UNESCO as part of the World Heritage in the category of cultural landscapes: Tokaj in Hungary, Climats-terroirs of Burgundy in France, Alto Douro in Portugal, and Vineyard Landscape of Piedmont: Langhe-Roero and Monferrato in Italy. The areas were analyzed from the aspect of historical development, geographical distribution, and development of winemaking and wine architecture in that area, based on data collected from literature, planning documents, information from the media, and accompanying photo documentation. The analysis includes an overview of the characteristics that these areas have officially classified as cultural landscapes by UNESCO, ie the fulfillment of criteria, as well as a comparative overview of natural and cultural factors and their specifics that are recognized as building elements of the area. In Table 1, the main characteristics of the study areas are given.

Table 2: Comparative overview of the main characteristics

Study area	*State*	*Location*	*Area [ha]*	*Year of inscription*	*UNESCO's criteria*									
					i	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*
Tokaj wine region	*Hungary*	*N48 09 E21 21*	*13.255*	*2002*										
Alto Douro region	*Portugal*	*N41 6 6 W7 47*	*24.600*	*2001*										
Climats, Burgundy	*France*	*N47 3 29 E4 51*	*13.219*	*2015*										
Land, Piedmont	*Italy*	*N44 36 31 E7 57*	*10.789*	*2014*										

3.1. Tokaj Wine Region, Hungary

The Tokaj wine region occupies the northeastern part of Hungary and includes seven wine subregions that are spread between 28 settlements, of which Tokaj is the largest (Albert, 2020). The region is located at the foot of the Zemplen mountain, along the Bodrog River and near the confluence of it with the Tisza River (Figure 1a). Numerous researches have shown that the first clear traces of viticulture and winemaking in this area appear at the beginning of the 12th century, but there are assumptions according to which wine was made many centuries before. In the 17th century, the wine was the main source of income for the rulers in this area and one of the resources for repaying independence from the Habsburg monarchy. The area is considered to be the first wine region to be recognized in the 18th century through the wine classification system of Europe, and in that period there was an expansion of wine production. The area has been on the UNESCO list since 2002[2]. What makes this region a cultural landscape are not only hilly vineyards spread around river valleys but also a long tradition of wine production and traditional patterns of farms, villages, connections with wine cellars as a traditional way of wine production that has been preserved to this day. The region is characterized by a specific microclimate, which is especially suitable for the production of so-called *aszu*, sweet wine for which Hungary has long been known. From the aspect of natural factors, Tokaj represents a synergy of topography, environmental and climatic conditions with volcanic slopes, and oak-woods that contribute to the

[2] More information can be found in the World Heritage Documentation for the nomination of the CULTURAL LANDSCAPE OF TOKAJI WINE REGION from 2000.

creation of a unique microclimate. The microclimate is determined by the sunny slopes facing south and the proximity of rivers. The region is characterized by a relatively warm climate, and the area is protected by the Carpathian mountain range, while the composition of the land is diverse. The land of Tokaj, which significantly affects the quality and character of the vine and wine, appears in the form of volcanic clay (Szepesi et al., 2016), as well as on the lower-lying layers of land wood, while near the river clouds, a sandy base prevails. This composition of the soil enabled the production of grape varieties Furmint, Harslever, Yellow Muscat, Kövérszőlő, Zéta, and Kabar. Today, the region is recognizable by the various dry wines produced here.

More than five centuries ago, winegrowers used volcanic rocks as wine cellars for aging wine, while these areas have been preserved to date. Wine cellars are especially specific in this region and occur in the form of vaulted and excavated cellars. Hundreds of cellars are buried several meters in cold volcanic rocks that provide an optimal temperature for wine aging. One of the most famous cellars is those in the Swabian village of Hercegkut, which are a masterpiece of architecture (Figure 1b). The entrances to the cellars protrude concerning the hill within which they were excavated and form a recognizable ambiance. Many additional facilities make the region interesting for visitors, such as medieval castles, monasteries, natural walking routes, local vernacular wineries (190), etc. The region is included on the UNESCO list according to criteria *(iii)* and *(v)*, ie on the region represents a distinct viticultural tradition that has existed for at least a thousand years and has survived intact up to the present while the entire landscape, including both vineyards and long-established settlements, vividly illustrates the specialized form of traditional land use that it represents.

(a) (b)

Figure 1: (a) Map of Tokaj Wine Region in Hungary, and (b) Wine cellars in Hercegkut (Source: https://hungarytoday.hu/hungarian-wine-region-tokaj-worlds-best-naturally-sweet-wines-94138/; https://visitworldheritage.com/en/eu/tokaj-wine-region-hungary/54e68463-83b8-4ff0-a9e4-58884dfabd5d)

3.2. Alto Douro Wine Region, Portugal

Alto Douro is a wine region that stretches along the valley of the river Douro and in the lower valleys of its tributaries. Research shows that wine was produced in this area during the Roman Empire, while in the medieval period it was kept within the monastery complex. In the 18th century, the region was officially adopted as the first wine region to enter the wine classification system in Europe. At the same time, Port wine is registered as an autochthonous wine of this area, while the region is known for the production of so-called. table wines (Lourenco and Rebelo, 2006). In terms of climate, the area is protected from the winds from the Atlantic Ocean, by the mountain ranges of Marao and Montemuro, while the land is rocky. The region is located in the continental climate zone and is characterized by warm and extremely dry summers and cold winters. Of the over 100 types of vines grown here, some of the most famous are Bastardo, Tinta Amarela, Tinta Roriz, Gouveio, Rabigato, etc. The landscape has been on the World Heritage List since 2001. What makes this region authentic and classifies it as a cultural landscape are the terraced vineyards that illustrate the long tradition of winemaking (Figure 2a). The steps of the terraces were formed over time by applying various techniques for growing vines and making wine, so the landscape also reflects the technological development of society. At the beginning of the 19th century, narrow and irregular terraces were built, which included only two rows of vines. In the 20th century, we encounter wider continuous, and properly shaped terraces that are slightly sloping and enable optimal sunbathing of the vineyards. Vineyards occupy each hilly landscape along with numerous estates (Quintas) and agricultural facilities (Figure 2b). The landscape is also recognizable by its white walls and houses, a large number of chapels, and natural national parks. The urban layout of the buildings, the grouped farm buildings, and the wineries that surround the main building contribute to the authenticity. The landscape was nominated for the UNESCO list meeting criteria (iii), (iv) and (v) (Lourenco-Gomez et al., 2015). Namely, in this region, wine production is a tradition more than two millennia old, and the

landscape is directly shaped by human activities (Fernandes and Farihna-Marquez, 2014). The natural elements of the landscape are recognized through the physical environment defined by the complex system of river valleys and vineyards, while the cultural dimension of the landscape consists of vineyards, and other buildings as well as the construction of walls.

(a) (b)

Figure 2: (a) Douro landscape, and (b) Quinta do Pego vineyard (Source: https://www.pinterest.es/pin/241575967491899959/; https://quintadopego.com/douro-region/)

3.3. The Climats, terroirs of Burgundy, France

The area is occupied by properly formed vineyard plots positioned on the slopes of the Cote de Nuits and Cote de Beaune mountains, south of the French city of Dijon (Figure 3a). The region consists of two units - vineyards grouped around the town of Beaune and the historic center of Dijon. Historically, vines have been grown in this area since Roman times, while Burgundy later became one of the most famous wine regions. The microclimate is what makes this area unique in the world. It is characterized by a mixed influence of continental, Mediterranean, and oceanic climates, hence the symbolic name Climats. The climate is generally temperate and has an extremely positive impact on the cultivation of vines, especially because the morning sun is pronounced, while the annual level is over 1300 hours of sunshine. The area is located at an altitude of 200-500m above sea level on a slope so that it is protected from westerly winds that bring pronounced humidity. The vineyard plots, of which there are over 1000, date from the period of the 7th century (Whalen, 2010). They are characterized by diverse geology and sunshine, which is why today it is specific that different varieties of grapes are grown within each, and thus different wines. Diversity in the geological composition of the soil and differences in the microclimate create several inspiring aromas of the wine.

(a) (b)

Figure 3: (a) Wine cultural landscape of Climats and (b) Piedmont landscape (Source: https://whc.unesco.org/en/culturallandscape/; https://langherealestate.com/en/langhe-roero-and-monferrato-in-piedmont/)

In terms of soil types, limestones are present, as well as deposits of marl and muddy soil, while those from which white wine is obtained stand out from the grape varieties. The land for growing vines has been divided from generation to generation so that the landscape is the result of evolutionary human activities. The vineyards represent the archetype of viticulture and terroir suitable for growing vines. Since 2015, the area has been on the World Heritage List as a cultural landscape, based on the fulfillment of criteria *(iii)* and *(v)*.

3.4. Vineyard Landscape of Piedmont: Langhe-Roero and Monferrato, Italy

The area includes the Castle of Cavour and five wine-growing regions in the southern part of Piedmont, between the river Po and the Ligurian Apennines. The region includes the Langa of Barolo, Hills of Barbaresco, Nice Monferrato-Barbera Canelli, and Asti Spumante, Monferrato of the Infernot. Research shows that the

earliest traces of winemaking in this area date back to the fifth century BC, while the area was important for wine production during the Roman Empire. In the Middle Ages, some of the types of wine for which this region is known to this day appear (for example Nebbiolo). Since the 19th century, the area has been especially important in the wine market (Settimini, 2019). The region is characterized by different soil types, and therefore grape varieties and wine types. The region is famous for red wines made from grapes Nebbiolo, Barbera, Dolcetto, and white wines made from Cortese, Arneis, and Moscato. The vineyards are built on slopes located at an altitude of between 150 to 450m above sea level. The area is authentic from exceptional natural and cultural values, not only because of the long tradition of making wine and growing vines, but also because of cultivated hillsides, vernacular architecture of rural areas, castles, numerous farms, wine cellars, churches, and cellars for commercialization. wines in populated areas. The landscape is harmonious, and a balance has been established between the architectural, historical diversity of contents that are reflected through the built facilities and the unique quality of the vineyards (Figure 3b). Wine culture is the basic highlight of this area and is reflected in the evolution of winemaking, wine quality, wine routes, wine museums, and cellars, which attract a large number of tourists. Since 2014, it has been under UNESCO protection based on the fulfillment of criteria *(iii)* and *(v)*.

4. CONCLUSION

The research was conducted to draw attention to the importance of cultural landscapes and wine landscapes. The obtained conclusions open opportunities for further research that would refer to the examined potentials of wine regions in other areas of Europe, including Serbia, which have a long tradition in wine production and climatic conditions for its cultivation. The conducted comparative analysis led to the following conclusions:

- all analyzed examples are included in the UNESCO list because they meet criteria *(iii)* and *(v)* relating to a unique testimony of a cultural tradition that existed and still exists or an authentic example of land or settlement use that is a representative example of culture or human interaction with the environment;
- analyzed examples show characteristics that can be universal when it comes to wine production and viticulture, or that is probably inherent in many other wine-growing areas that can be found in the world-this indicates the possibility of considering many other vineyard territories for enrollment in World Heritage List;
- in terms of natural elements nominated by the analyzed areas for the UNESCO list, the following stand out as common: autochthonous grape species grown in this area, ie the unique microclimates of the area in combination with the specific geological structure of the soil;
- in terms of cultural elements that nominated the analyzed areas for the UNESCO list as common stand out- long traditions of wine culture and winemaking, vernacular architecture of buildings used in the production and storage of wine and other purposes and often originating from different periods, they have different purposes and form specific cultural routes of movement of people, uniting various activities, the specific urban layout of the area and authentic buildings.

ACKNOWLEDGEMENTS

The authors express gratitude to the Ministry of Education, Science, and Technological Development of Serbia for providing partial support for this paper.

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WHEN DISASTERS AND ERRONEOUS GOVERNMENTAL DECISIONS MEET IN HISTORICAL CENTRE: THE CASE OF THE OLD MARKETS OF THE LEBANESE TRIPOLI

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ABSTRACT

Tripoli of Lebanon is one of the poorest cities that overlook the Mediterranean Sea. It has a long history of more than 34 centuries, it is home to many historical sites and continues to be the second largest city having Mameluke architectural heritage after Cairo. The historical markets of this Islamic city are still in unceasing activity since the 13th century. Due to natural disasters, especially the flood of the river, local and regional wars and conflicts, and mostly, erroneous governmental planning, many historical buildings were lost and the social and economic fabric of the city was dissociated.

Referring to the historical characteristics, this research aims to study the features of the bustling Tripolitan souks and khans, the reasons behind their long existence and their survival until now. The paper will present a list of possible cultural and technical actions and policies to be taken by authorities and residents that affect the architectural heritage of the old city. This list is based on new planning methodologies and on old studies to overpass the current situation of accumulated deterioration, poverty and lack of opportunities.

Keywords: *traditional markets, Arab markets, Tripoli of Lebanon, historical monuments, Planning decisions*

1. INTRODUCTION

Tripoli of Lebanon is a city to the north of the country, on the eastern cost of the Mediterranean and it is the second biggest city in Lebanon after the capital Beirut. Its settlement went back to the time of the Phoenicians, more than 2700 years ago. However, the present city dates back to 1289 AD, when the Sultan Qalawun captured the city from the crusaders, and redeveloped it around the inland fortress of Raymond de Saint Gilles [1]. Tripoli is a proper creation of Mameluke; within their first fifty years of government, a big part of the core had already its clear features that will remain unchanged until recent days [2]. It became the second most important Mameluke city after Cairo in Egypt, and the third important city in the Levant after Damascus and Aleppo [3]. The souks and khans of Tripoli, where souk is the Arabic name for Market and khan is a caravanserai, are the main commercial pole of the city and they kept a continuous activity for more than 700 years with more than 1000 active shops distributed between long narrow alleys and khans [4].

The survival of such souks until now with all their historical features and their unceasing activities in an environment of deterioration and incessant conflicts and wars is a curious case worthy to shed light on. Previous studies [5] [6] studied one of the major problem of the city which is the urban planning of the Abu Ali river that divides the city into islets; other reports showed a single case of restoration of one market or khan [7]. The objective of this paper is to give a list of possible social, economic and technical actions and policies to be taken by authorities, organisations and residents to give back the historical centre of Tripoli its old beauty and glory. Before that, a brief description of the Mameluke organisation of the old core of the city will be

presented; the reasons behind the seven century of unstopped activities will be discussed. These reasons will be the base for the renovation and rehabilitation of these historical markets. Moreover, the main reasons of the deterioration, decay and demolishing of the souks will be listed with emphasis on natural disaster (the flood) and on urban governmental decisions.

2. TRIPOLI AND ITS 700 YEARS OLD MARKETS AND CARAVANSERAIS

Buildings and souks in Tripoli form a single body; the relation with one another is the relation of veins and arteries to a living body. The biggest part of the old core was situated on the left side of the river, underneath the fortress built on a hill, surrounded by the two old zones: Al Nouri (Fig. 6) and Al Hadid (Fig. 7) which are the core of the old souks. To the right of the river, stands out Al Souaiqa and El Tebbaneh, mainly residential and a very poor zones.

The mameluke organisation of markets marks until now the old centre of the city. One would observe that specialization in goods was the regulating rule in markets as the names of the markets indicate [8]; goods and services that were important in Islam or deemed valuable to a Muslim - such as holy books, rosaries and perfumes - were positioned close to the mosque [9] [10]. The area of Al Nouri which has a superficies of around 0.8 km^2, is the heart of the historical centre [11]. The great mosque of Tripoli, or the Friday Mosque, known as Jami' Al Mansoury Al Kabir, is located in this zone, surrounded by souks of noble products such as Souk Al Sagha or Jewellers' Market which is a semi roofed market dedicated only to the manufacturing and selling of gold with around 120 gold shops [4], [12] (Fig.1 a); Souk Al 'Attareen or Perfumers' Market which is one of the longest old markets in the city, all its shops were dedicated to sell perfumes and medical herbs, but nowadays few perfumers are still working in this alley while the majority of the shops switched their function from selling perfumes to selling fruits, vegetables and food [13] (Fig.1 b), Khan Al Saboun or soaps caravanserai was built around 1480 AD in which, hand-made soap is still manufactured and sold here (Fig.1 c), Souk Al Ma'aref or Knowledge Market was full of libraries and bookshops, part of them were transformed into wardrobe shops. Perpendicular to the Jewellers' market, is located Souk Al Bazerken or Traders' market [14] which continues the Perfumers' markets until reaching Souk Al Nahhasin or Coppersmith' market in zone Al Hadid. The devotion of the shops of this market was switched from fabrication of clothes to selling ready to wear fashion. Al Bazerken is continued by Souk AL 'Areed (the large Market) which is a wide opened alley of 9 to 12 m of width (from this big width comparing to old souks comes the name "Large") [15]. Souk Al 'Areed was formely known Souk Al Kindarjiye or shoemakers' Market and now it is dedicated to sell ready to wear shoes. A branched alley of it is a roofed alley where some internal shops kept the traditional vocation of fixing shoes.

Figure 1: (a) Souk Al Sagha or Jewellers' Market, (b) Souk Al 'Attareen or Perfumers' Market, and (c) Khan Al Saboun or soaps caravanserai
Sources of illustrations:
http://www.destinationlebanon.gov.lb/en/Home/Detail/23, Accessed 29 September 2020
http://www.sadaakkar.com/ سوق-العطارين-في-طرابلس-من-سوق-تاريخي-لل, Accessed 29 September 2020
https://www.sobeirut.com/souks-of-tripoli, Accessed 29 September 2020

Al Hadid (Fig.4) is another area of the historical centre of Tripoli with many historical markets. It is not at the vicinity of the great mosque, hence, the products manufactured and sold here are less noble than the previous ones. The most notable markets of this zone are: Souk Al Nahhaseen or coppersmiths' market, Khan Al Khayyatin or tailors' caravanserai (Fig.2 a), Khan Al Masriyeen or Egyptian caravanserai, Birket Al Milleha where a small fountain stands in the middle of the markets, Souk L Haraj (Fig.2 b), etc. Souk L Haraj with its 2300 m^2 and its high vaulted ceiling of 8 m [16], is for some historians a "strange and undetermined structure" in the middle of the souks. It has a hybrid structure of a khan (caravanserai) and of a souk (market) [7], [2]. Now, a

coffee shop took the place of many of its old small shops. Many mosques are situated in Al Hadid Zone, the most famous two are AL Tawba and Al 'Attar Mosques.

Figure 2: (a) Khan Al Khayyatin or Tailors' caravanserai, and (b) Souk L Haraj
Sources of illustrations:
https://www.lebanoninapicture.com/pictures/khan-al-khayyatin-in-the-old-dowtown-of-tripoli-tripoli, Accessed 29 September 2020
https://www.qantara-med.org/public/show_document.php?do_id=1044&lang=en, Accessed 29 September 2020

It is worth to mention that within all the old souks are spread a number of Madrasah or religious Islamic schools and public baths such as Hammam Izz El Din, better known as Turkish baths, even they were constructed many centuries before that the Ottoman had governed Lebanon since 1516 AD. Nowadays, a one-way car street passing through the coppersmiths' market separates Al Hadid and Al Nouri zones, and fortunately, it is the only non-pedestrian street in these pedestrian souks. The left and right banks of the river were connected by stone arches bridges destroyed by the flood of 1955 and never rebuilt again (Fig. 3 a, Fig. 4 a), but replaced by new concrete simple beam-bridges, not in harmony with the old aspect of the city. EL Tebbaneh, to the right side of the river, is dedicated for wholesale retail of different merchandise especially fruits and vegetables.

In summary, walking in the old markets of Tripoli resumes the experience of visiting a mature Islamic city that holds within its social fabric communities of Muslims and Christians that live together in bustling and narrow alleys and markets that branch from the Friday mosque and reach the citadel built on a strategic point [17].

3. THE CLIENTELE CONTINUITY AND PHYSICAL SURVIVAL OF TRIPOLI'S SOUKS

The study is referring to the physical survival of the souks as arrived to us after the declaration of the state of Great Lebanon in 1920. After this period, Tripoli has experienced a number of accelerated transformations that would undermine the integrity of its ancient fabric by opening new axes [18], the increment of its population by 10 times in 100 years due to the increase in economic activities that was tripled in 30 years [19] and many architectonical changes that went through the city implementing cheaply constructed pomposities of concrete, in disharmony with the features of the traditional buildings [20].

The clientele continuity of Tripoli's souks is correlated to many factors, especially the geographical location of the streets in the core of the historical down town of the city (Al Nouri and Al Hadid) that have a low density of population, but surrounded by the most populous area of the city (Table 1): Al Tal (87 068 people), AL Haddadin (77 581 people), El Tebbaneh (34 789 people), Al Souaiqa (14 231 people) [3]. Hence, the old markets compose undisputedly until now the commercial nucleus of the major residents of the city [11]. As well, the low prices of the merchandises in the souks of the city comparing to other places attract the neighbouring population that give Tripoli the nickname of 'Emm Al Faqir' or the mother of the poor. Hence, the souks have become an important place for low-income families [11], [9]. Being the biggest city in the north of Lebanon, the souks of Tripoli are not restricted to the residents of the city, they are welcoming customers from all social fabrics and from all over the country, especially the North Governorate [4]. Moreover, being specialized in one product or merchandise and standing as one of the rare places in Lebanon where it is possible to feel the old orient, the old pedestrian markets of Tripoli with traditional crafts, goods that are not present in the new commercial centres, foods, cheap products, religious facilities and the covered portions that protect pedestrians during winter and summer encouraged clients to visit and shop at the souks [9].

Even the presence of customers and traders keep the markets alive, the physical survival of the architectonical features of Tripoli's souks is not related only to the continuity of the clientele. For example, the capital, Beirut

kept its clientele and its position as the biggest commercial city in Lebanon, but many old markets were destroyed to give place to the new urbanisation which change dramatically and forever the shape of the city [21]. Many bad and good events made together convenient factors for the physical continuity of these souks. For instance, the loyalty of the people of Tripoli to their heritage and the Lebanese Civil war (1975 -1990) played a big role on passing to us a good part of the old core of the city. In the fiftieth of the twentieth century, in many countries of the Third-world, the concepts of celebrating highways as symbols of freedom and progress and exposing key monuments by stripping them of their urban context were consistent with Western planning ideologies [10]. Hence, the government in collaboration with the municipality planed an urbanisation plan based on destroying the old narrow streets while keeping the key monuments. As it will be mentioned later, the people stopped this project and refused this "innovative" planning. And during the era of the civil war and post-war, the Lebanese government struggled with economic issues and the priority of the reconstruction of deteriorated buildings and infrastructures especially in the capital [21], these facts closed the curtains on the pre-war plans. From the nineteenth, with the help of the Ministry of Culture, international funding from the World Bank, European Governments and other private and public donor agencies helped in the urban/ tourism regeneration of some historical souks [22]. For instance, Souk L Haraj was restored in 2005 with the cooperation of German Government [7]. Khan Al Khayateen was restored with the collaboration of the Spanish Government, Souk al 'Areed was restored by the local organisation of Al 'Azem Society [15] etc.

These are the major factors that contributed to the physical remaining of the souks along with many ramified and interconnected reasons related to the mechanical properties of the buildings and their resistance against natural factors, the protection of historical individual monuments by existing legislation [18] and many others.

4. THE FLOOD AND GOVERNMENTAL PLANS

Abu Ali River in Tripoli was the true maestro of the Tripolitan life, it was the heart of the new mameluke settlement although it disturbed the life of the citizens by its floods at least once every century. The first flood of the river after the Mameluke settlement was mentioned by Safadi, it took place in 1344 AD. The next big flood was in the beginning of the fifteenth century in 1407 AD when Ibn Hajar mentioned that the people of Tripoli had not seen anything like this, many buildings were destroyed and many people were killed. After almost one century, in 1503 AD, the flood of Tripoli river destroyed many houses and shops, similar to the flood of 1612 AD that affected Al-Tawbah Mosque; an historical inscription stills memorize the event of the renewal of the mosque after this big torrent. In 1749 AD, the river overflowed for three days and raised above the bridges about 12 cubits or 5 meters killing many people and destroying many houses. The flood of 1844 was not so different, because it destroyed many shops near the river and killed a number of crops and people. The last big flood was in December 1955 where more than 60 homes and 500 stores have been destroyed, 30 homes have collapsed, and the number of victims has exceeded 120 victims (Fig. 3 b, Fig. 4 b), part of the old Arches of the Prince has been destroyed, Al Souaiqa and Al Jadid bridges have been destroyed too (Fig. 3 a, Fig. 4 a) [23].

Figure 3: Abu Ali River before the flood of 1955 - (a) Jisr Al Jadid or new bridge, and (b) houses built on the two banks of the river
Sources of illustrations:
http://33shamy.blogspot.com/2016/08/blog-post_9.html?m=1, Accessed 29 September 2020
http://33shamy.blogspot.com/2016/08/blog-post_7.html, Accessed 29 September 2020

After this flood, by the end of 1968, the government decided to provide armour against floods for the following 1000 years. However, what it was left safe by the flood, was destroyed by this cultural massacre that harmed both the river and the city. Around 2,000 homes were demolished including historical madrasah and caravanserais: Khan al Jimel; Khan al Baroudi, Khan al Zait, Khan al Laymouni. Local strikes could save the historical mosque of Al Bourtasi that dated back to the beginning of the 14th century. Downstream river course

was straightened by an incongruous rectangular concrete channel with 5 m high vertical lateral retaining walls and surrounded by 24 m wide avenue at each side. The river's ecological functions were lost, wetlands and other habitats were dried up, the only recreational part of the residents that live nearby was destroyed, many athletic, cultural, social and religious activities that flourished around the river disappeared (Fig. 5) [5], [23].

Figure 4: Abu Ali River before the flood of 1955 - (a) the minaret of mosque Al Bertasi, and (b) Abu Ali River as a Lebanese post stamp
Sources of illustrations:
http://wwwtrifayha.blogspot.com/2012/06/1.html?m=1, Accessed 29 September 2020
https://www.pinterest.com/pin/484348134906593141/, Accessed 29 September 2020

As all the above disastrous consequences were not enough, this project disconnected the neighbourhoods from each other, by splitting the city in two parts. Al Souaiqa and El Tebbaneh are totally disconnected from the rest of the city, except from two concrete bridges access. Large sections of the residential zone of Al-Souaiqa were demolished for this project. These disconnected zone becomes unsafe and the pole of the poorest people of the city who are using now the river as a garbage dump; moreover, vegetables and fruits vendors in El Tebbaneh district are squatting the public space along the river causing high traffic congestion and affecting the surrounding (Fig.5) [5], [6].

Figure 5: Abu Ali River after the project of 1968
Source of illustration:
http://alfayhaalb.com/?p=20732, Accessed 29 September 2020

The project of 1968 did not come from the void, it was a clear result of the triumph of the blind imitation of the modernization in the conflict between the conventional form of modern development and the urban fabrics of historic cities. For instance, in 1947, a master plan was developed by the French Planner Eglie following a Haussmanian type model of grand boulevards, roundabouts and open spaces [5]. The plan was intended to widen the new bridge or Jisr al-Jadid above Abu Ali River which was lined with shops, and for many reasons this widening was undesirable by conservationists, as the committee of UNESCO mentioned in its report of 1953 [19]. Unfortunately, the bridge was destroyed by the flood and then totally removed by the 1968 project. In 1964 a new master plan of the city has been proposed but was not applied because it did not meet the interests of the landowners and the political stakeholders. In 1971, the Lebanese Government decided on a Master Plan proposal which is very different from the 1964 Master Plan proposal. What are of interest in this master plan are the proposed interventions in the historic core [5]. Maybe the reason behind this plan was the presence of "zone of desperados" unreachable by the governmental armies because of the tiny pedestrian roads and the contiguous houses. The chronic deprivation that affected the city since the independence era and its permanent and deliberate marginalization by the state, led to a growing feeling of oppression, injustice and lack of justice that was pushing some of its people to disobey to draw the attention of state institutions to

them. These insurrections were translated into the events of 1969 -1972 in El- Tebbaneh and then in 1973 in what was known as the "Al Kaddour state" in the old core of the city until the Lebanese state eliminated this "phenomenon" in 1975. Meanwhile, the state, wearing a modern urban formula to bring light into modest and dilapidated homes, intended to conduct new urban planning for the old markets, and to construct wide streets [30]. The main reason aimed at eliminating the historical pedestrian twisted corridors, which prevented the security forces from arresting the wanted persons. Fortunately, only two souks (al Nahhasin or coppersmiths and al-Kendarjiyeh or shoemakers) were affected. The Tripolitans refused this project, they considered it a demolition of the city's memory. It was remarkable the strike of the people against the trucks who wanted to destroy the old pedestrian souks to keep only the "Main Monuments" [24].

5. OTHER PROBLEMS OF THE OLD CITY

Not only the floods and the governmental plans were the only problems of the city which changed its authentic face. The old city and surrounding neighbourhoods suffer from many different problems. The first of them is the high population density which reaches between 260 and 500 persons/hectare in the old city and Haddadin and raises dramatically in the poor area of El Tebbaneh to reach occasionally between 1000 and 1400 persons/hectare (Table 1) [3], [5].

Table 1: Number of people in the old core of Tripoli [3]

Location	Al Tal	Al Haddadin	Al Kobbe	El Tebbaneh	Al Souaiqa	Al Rimmaneh	Al Nouri	Al Zehrieh	Al Hadid
Population	87 068	77 581	91 076	34 879	14 231	2543	3773	8347	972

What makes the problem of high population worse, is the illiteracy where 8% of the population of the old city are illiterate, 35% of heads of economic units are illiterate and 55.2% did not exceed a primary education [5]. The high level of low education is correlated with poverty and high unemployment rate which impose two ways of living: first, encouraged by the Islamic law, many families depend on the donations by rich people which creates from religious point of view a balance between rich and poor people, but unfortunately it creates a state of passive dependency; second, the politicians and what they represent of public institutions, instead of helping the residents by changing their current situation in implementing economic and educational plans, they take advantage of this situation in order to attract new voters by paying them and as a consequence, they establish a relation of obligation and a mentality of corruption and bribery [5]. The absence of social and economic safety and the static depressed situation of no change, lead to a depressed micro-economy, lack of social services. As a consequence, the aesthetical and structural condition of private properties and monuments is declining over time without a chance to restore them in the near future. The historic city centre is suffering from both lack of public spaces and pedestrian and vehicular accessibility difficulties; for example, the environmental condition of the city is deteriorating; random and spontaneous concrete constructions, not in harmony with the long history of the centre, are rising here and there killing what it was the only recreational part of the city [11], [20]. The Lebanese civil war (1975-1990) had a hand in destroying some buildings and it changed the demographical tissue of the city and reduced or destroyed some important commercial activities [1]. Some local conflicts returned back in 2007 and 2014 and destroyed few markets and khans [15], the fact that declared Tripoli as a the "Lebanese Kandahar" or a city of eternal conflicts. These conflicts reduced the economic capacity of the residents and the touristic reputation.

To all the precedent reasons, the whole situation of the Lebanese Government with limited mean and few desires to regenerate feasible projects and pay attention outside the central capital marginalized more Tripoli [11], [3].

6. CONCLUSIONS AND FUTURE DEVELOPMENT

As it was mentioned in the UNESCO plan study of 1953, "the visitor has the same pleasure in Tripoli that he feels in wandering through the by-streets and *mercerie* of Venice or the old parts of Vienna, Paris or Florence" [19]. Hence, the old town of Tripoli has big potentials that can transform drastically the poorest city

on the Mediterranean to an attraction city emphasising its hidden beauty. As it was mentioned in the previous sections, this gem went under a lot of undesirable events and what it was a little work of restoration few decades ago [19], is becoming more and more complicated everyday as a result of the accumulation of deteriorations and destructive events.

For the rediscovering of this hidden and very-damaged tangible cultural centre, different, fast and responsive economic, social and technical actions should be taken by the governments, private and public organisations to satisfy the present and future necessities of the local residents involving them in the main decisions, “creatively absorb and interpret their needs” and respecting their quotidian habits and traditions [10], [25]. What emerges in the decay of the historic corpus is on one hand a technical problem that can be resolved at a professional level; and in the other hand is related to the desire of the correspondent authorities to take such decision.

The first step in improving the current situation of the bustling commercial centre of Tripoli is to estimate them. Estimation comes from the rediscovering of the hidden inner identity [10], [24] which means “peeling off the dead crusts accumulated over time around the kernel of life” by absorbing certain philosophies and life style that underestimate or refuse the own heritage, past and present, comparing them to alien “Idol” realities (“cultural inferiority complex”). The act of belief in this heritage and the intention of rediscovering it pave the ways to attract foreign investments [10]. However, in Third-World context, it is hard to convince people living in poor conditions of the importance of cultural heritage, they had a misconception that culture and economy are two parallel lines which do not meet. Culture is an impractical concept for them, but it can unleash financial benefits and side effects. Hence, boosting the economy and improving their living conditions are indispensable points and can be aligned with the cultural heritage development.

Presenting the importance of the historical conservation of the old souks relays on local experts, architects and engineers through organizing cultural events, courses and activities about the topic and pushing schools and cultural organisations in raising generations of citizens that appreciate the historical identity. It is far from logic to relay on foreign planners and architects who are well trained but they are not experienced in local habits and conditions to effectively produce sound policies and planning solutions [26]. However, local engineers and architects, with valuable knowledge on local characteristics, are not always adequately trained to translate their information into urban design and planning [26]. From here comes the importance of educating and training local brains on developing and applying modern methodologies with respect to the native identity without a blind copying of ready to use plans and strategies.

In terms of planning, restoration, demolishing and rebuilding, many concepts exist and may not all experts agree on one, but some criteria and rules must be followed such as the general guidelines of La Carta de Venezia and ICOMOS recommendations [7]. It should also be pointed out that old masons’ techniques are quite different than the abilities of the majority of the present ones [27]. Hence, the recruitment and training of skilled labour-workmen and craftsmen is a necessity for the purpose to do a careful restoration in harmony with the local style [19]. This necessity can be an additional opportunity for hiring local unemployed residents and teaching them traditional work of arts which have for long been neglected and then rediscovered by academic investigations of historians, architects [19] and some few existing masons that conserved such abilities [27]. Unfortunately, currently most of the traditional manufacturers switched the manufacturing operation by selling imported products. The consumerism trend of the society affected a lot the disappearance of local handcrafts. This problem can be overpassed by encouraging again the local productions, as in the case of Khan Al Saboun that has an international reputation [28]. One more idea to improve the souks is by implementing a plan to encourage responsive tourism in a way that the old souks do not rely totally on tourists, but to integrate them in an organized social and economic framework.

Regarding the technical points, many hard decisions should be applied to overcome the problems listed above:

- The first problem that should be resolved is to reconnect El Tebbaneh or the right bank of the river to the rest of the historic city with pedestrian bridges by demolishing the existing incoherent beam concrete bridges and rebuild stone bridges taking into account vehicles and pedestrians. Second, organise or relocate the market of the vegetables and fruits in El Tebbaneh district. A next ambitious step will be to rebuilt old-style restaurants, coffee shops and shops dedicated to the manufacturing and selling of traditional handcrafts along the bridges and some parts of the two banks of the river as the old city was developed.

- Transform the concrete channel of the river to an ecological corridor by removing the concrete walls and filling the bed of the river with gravel and then revitalizing some of the river's ecological functions. Studies of the vegetation and wildlife habitat, ecological and landscape approaches should be incorporated in the master plans. It is an essential point to give again the river its natural function instead of being a garbage dump.

- The key monuments, Khans, souks, Madrasah and baths should be rehabilitated at a first stage with the intention of obtaining a continuous commercial nucleus that reveals its authentic architectonical features, similar to the work of restoration done on Souk L Haraj, the Great Mosque, Souk al Areed, etc [7], [15]. Some of the madrasahs could be restored to host social and cultural events. Far from the emphasis on one individual monument, a cohesive historical pole can attract more investments, clients and tourists [29].

- The second stage in the internal souks is to restore the houses, especially the finest and most neglected ones and turn them into hotels or boarding-houses.

- A third stage in restoring is to restore the residential zones adjacent to the central core, which are the hill above the citadel and the part of El Tebbaneh and Al Souaiqa to the right bank of the river. This step includes the restoration of the residential buildings to the original colours of the city which means white houses with green terraces [17] or red bricks, and not colourful houses, similar to tropical towns, which is far from the authentic identity of the city. The hill of Abu Samra that looks directly on the citadel needs an urgent planning. The existing high-rise concrete buildings of 12 stories dominate the panorama in a way that the citadel appears as a mediocre structure in comparison to them. The hill should be redeveloped as a public park, without buildings and planted by adequate vegetation and trees such citrons, berries which give back the city and the citadel is ancient splendour.

The ancient city of Tripoli was a work of art, with the right decisions, it could regain again its former beauty.

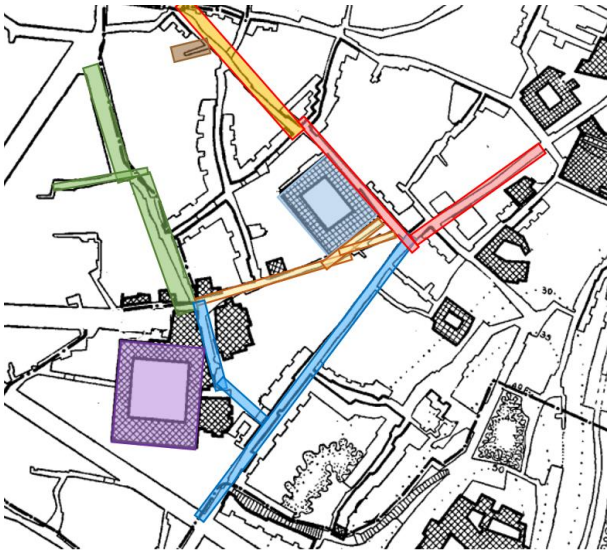

Figure 6: Al Nouri zone: The great Mosque, Souk Al Ma'aref, Souk Al Sagha, Souk Al 'Attareen, Khan Al Saboun, Souk AL Bazerken, Souk Al 'Areed, Souk Al Kindarjiye, Source [19]

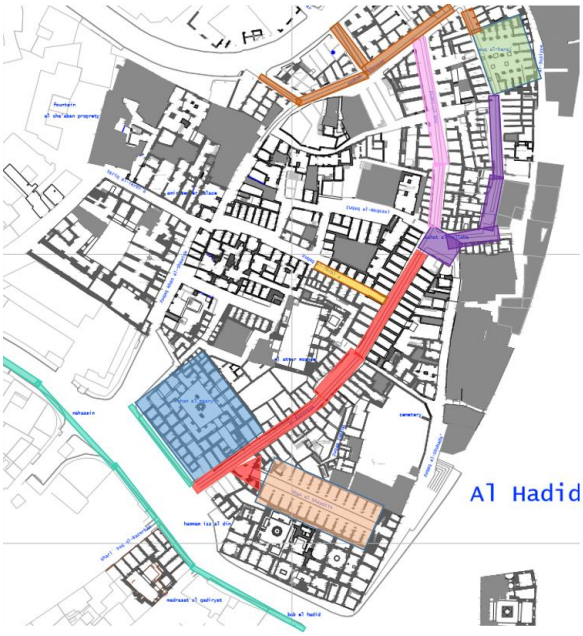

Figure 7: Al Hadid Zone: Souk Al Nahhaseen, Khan Al Masriyeen, Khan Al Khiyyatin, Souk Al Bazerken, Birket al Milleha, Souk L Haraj, Souk L Jdid, AL Terbee'a, Zoukak Tanbouzat, Source [7]

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CONSEQUENCES OF IMPROPER PLANNING - ARCHITECTURE IN PIROT

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ABSTRACT

This paper analyses the urban plans of the city of Pirot and their influence on modern architecture. We are witnessing growing problems within pollution, energy problems, insufficient parking space, and lack of public areas. Also, to evaluate contemporary architecture according to modern theory and practice, the authors propose the development of the city by considering crucial problems. We hypothesize that planning has greatly diminished the value of contemporary architecture. Case studies are done for terraced houses in the settlement of the Tiger factory newer houses on the left bank of the river Nisava and Western quay settlement. Their design is evaluated according to the criteria of the five design principles.

Keywords: *urban planning; Pirot; architecture*

1. INTRODUCTION

Pirot is a city in southeastern Serbia. The urban area of the city has a population of almost 40000. The city has a rich geographical feature: mountains Stara Planina, Vlaska Planina, and Belava; rivers Nisava, Jerma, Temstica, and Visocica; one bigger lake: Zavoj. The city of Pirot has a rich culture with notable churches and protected architecture of XVIII and XIX century. Churches and inherited architecture are presented in science. Illustration of the urban development of Pirot in the XX century is of great importance for this topic (Ćirić, 1969). In a contrast to this, works about ancient churches stand the contemporary architecture of Pirot, which is not presented at all. The contemporary urban design of the square is the only topic about which it was written (Stanimirovic, 2016). As the amount of living space in this city is constantly increasing, we believe that it is necessary to present an analysis of newer architecture and urban design. In this regard, in this paper, we will evaluate the concepts of urban design in Pirot and its present architecture. We believe that average architecture gets more value through good urban design. Also, good architecture in a not so good urban design gets a lower value. We hypothesize that planning has greatly diminished the value of contemporary

architecture. We will try to evaluate design according to the criteria of the five design principles (Jovanovic et al, 2018).

2. THE FOUNDATION OF URBAN DESIGN IN PIROT

The regulation plan of the town of Pirot from 1888. is the first official document of the Kingdom of Serbia after the liberation from Turkish rule. (Ćirić, 1973). Like other liberated places, Pirot got its urban plan, which consisted of two leaves (Tijabara and Pazar) that covered the territory on the left and right side of the river Nisava. The existing situation was drawn and a new situation was proposed. The plan accepted the Turkish scheme of the settlement (especially in the part of Tijabara), which arose spontaneously. According to European standards, straight streets to the railway station are planned, while other, busy streets will remain winding due to the position of already built houses. However, the plan shows the intention to relocate houses that violate the straight line of future regulation. The development of Pazar was conditioned by the installation of protective trenches through which excess water flowed. The development was also influenced by the position of the Constantinople Road. Thus, the rectilinear regulation was given to Kralja Aleksandra Street (later Marshall Tita), as opposed to other oriental and rural compositions of the space. Along the side of the direction Nis-Sofia (northwest-southeast), there is a higher density of mostly residential houses, while the interior of the blocks consists of green spaces intended for agriculture and the then way of life. Following this plan, the river Nisava will become regulated from the main bridge which connects Tijabara and Pazar. Instead of a winding river, the Nisava will flow in a straight line. What can be concluded is that the conditions of the topographic environment were not misused in this urban settlement (Ćirić, 1969). The degree of urban deformation of the city (the ratio of the real and urbanly justified situation) after the Second World War was 15-25%, while before the war it was 10-15%. For the sake of comparison, Leskovac and Nis have 70% at a similar time, Aleksinac and Vranje about 10%.

Figure 1: Pirot, (Source: https://www.google.com/maps, Accessed: September 20, 2020)

We think that Ciric quite rightly pointed out the importance of the proper organization of the urban character of Pirot. From the conclusion that no major mistakes were made in the development of this place in the past, Ciric proposed a plan that took into account the intertwined contents of natural and cultural origin. According to him, the main orientation of the relief is northwest-southeast, due to the flow of the river Nisava, which passes through Pirot and the tectonics of the valley. A calmer and less frequent direction is the transverse, northeast-southwest. Furthermore, the composition of the city is influenced by Sarlah Hill as a landscape

treasure, hydrographic contents in a functional aesthetic sense, landscape vegetation contents, views, street and traffic network, monumental and ambient values.

In relation to the time when Jovan Ciric wrote about the urban organism of Pirot, the current situation is worse. First, the opposite current in decision-making advocated the view that Pirot should be developed in the direction dictated by the bridge over the river. Ciric's idea of the road to Nis which passes by the ambient and monumental stronghold, Gradic, next to the hill Sarlah, was abandoned. A boulevard was started parallel to the direction of the main street, which was supposed to reduce the load on the main axis of the city. However, its completion was completely destroyed by the construction of a residential building in that direction. Thus, the transverse direction gained in importance.

Pirot has ambient and monumental urban strongholds that are given both in the natural environment and in the historical heritage of the city. Ciric's idea is completely correct: Since Gradic has both, it should be emphasized and refined, not to allow any movement of construction. However, although the law defines the protected ambient units from Gradic to Gimanizja, the permanent construction on this stretch is completely opposite to this idea. In fact, if we look at last year's renovation of Gradic, modern housing construction, and the current plan, the only environment that has not been destroyed in the area of the quay on Nisava.

3. TERRACED HOUSES IN THE SETTLEMENT OF THE TIGER FACTORY

Figure 2: Pirot, Tigar’s terraced houses (Photo: Mirko Stanimirovic)

In the sixties of the XX century, the tire factory Tigar formed a housing cooperative with the aim of more favorable construction of apartments for its employees. The factory hired the famous Yugoslav architect Mihajlo Mitrovic to participate in the endeavor to build a combination of an apartment and a classic house based on the workers' settlements in Wembley (UK) 880 apartments for workers were built in 1964, on the right bank of the Nisava. At that time, one of the designers, the architect Dragoljub Aleksic, rightly criticized the construction of apartments in large blocks from 1958. Earlier individual buildings in Pirot underwent an evolution in the period 1945-1965 under the influence of administrative measures and retained advantages over apartments in large blocks. We support Aleksic's position that for Pirot, the most rational housing construction is in rows and that it provides residents with very decent comfort. Opposite to the economical

multi-story buildings, Tigar's apartment has its yard, parking, and two entrances, but also its roof. Block housing construction actually requires much more green space, large parking lots, playgrounds, etc. It makes this type of construction seemingly better (Aleksić, 1971), because not enough of the mentioned contents were realized in any block. If we compare the situation during socialism and current capitalism, such a space within multi-story housing is incomparably better in the case of the former. In Pirot, and probably beyond, it did not happen that today an investor tidies up the yard instead of building squares of his product.

Figure 3: Houses plan- a) Wembley, College Road HA9; b) Pirot, Tigar factory housing (Drawings: Mirko Stanimirovic)

Later, the expansion of this settlement was realized. The settlement on the right side of the Nisava was given the epithet old. The new one was built on the left side of the river, but far from Nisava. The apartments had 3 or 4 rooms, in 2 levels. The apartments on 3 levels had a narrower front. This concept of settlement quickly became a model for workers' apartments throughout the country. Indeed, in contrast to the scattered houses from previous periods, the rows of houses in a row were placed in a precisely defined order similar to the English model from the 1930s. Everything was defined, from the height of the hedge to the type of flowers, trees, and fence. The courtyards were actually extended by the greenery of the quay and the tree-lined avenues that separated the rows.

Modest houses with gabled roofs adapted to the terrain, which suited both the ambiance and the concept of workers' apartments. The houses at the ends of the rows also had a significant part of the yard on the side, which made them more exceptional, with an additional load of energy for heating. However, while the urban design was flourishing, the organization of apartments had several design problems. Coupled with poverty, this problem escalated to the addition of brand new backyard houses in the late 20th century. Of course, the law protected the design, but its implementation failed. The need to live in one apartment for three generations required the expansion of apartments, disrupting the shape and character of the settlement. It is interesting that the ideal picture of the old settlement was so strong that none of the researchers addressed this phenomenon. The newly expanded apartments actually intensified the problems realized from the beginning. Rooms were often built without windows, and the organization has become so degraded that it is clear that the struggle for squares has won over comfort and architecture. Certainly, we can conclude that the problems (which we will analyse later) were invisible due to good urban design. This would confirm our assumption from the beginning - in good urban design, average architecture gets more value. In this case, the value of the apartments is equal to the value of the settlement, which later influenced the new arrangement of public areas in Pirot. Namely, the area next to the river is naturally seen as very attractive, and in addition to the defense against the river overflowing, it becomes a city promenade. After a couple of decades in the dark, the city puts street lighting in the tree lines and thus builds a new landmark of the city. But this intervention, in addition to

the new look of the old ambiance, also contributed to the perception of the initial problems, which will later continue to the settlement on the left.

From the plan of the settlement on the right side of the river, two directions of the apartment line can be clearly seen. The first, the most attractive, is parallel to the SE-NW river. Directly to it is the direction of most of the rows, SW-NE. The block was disturbed by the construction of three multi-story buildings (which respect the set direction), around which the contents of the trading nature naturally appeared. Other rows of houses are clumsily placed according to the current and planned street network. Anyway, if we look only at the first two directions, which are the result of the urban design of the time, we notice the following problems. First, the organization of apartments is the same, regardless of orientation. One concept was copied towards both the river and the tree lines, without taking different sides of the approach from the residential streets. Second, the position of the living room in all apartments is turned to public communication, instead of being turned to an intimate courtyard. At the time when the quay was unlit, the apartments by the river were in a certain intimate situation. Their comfort was enjoyed only by mosquitoes and the periodic gathering of young people. In the current situation, the quay is a very frequent communication (not only pedestrian, unfortunately) and the ambiance of the living rooms is significantly endangered. Third, in some rows, the living room has an inadequate orientation - located in the north or NW. Fourth, the glazed terrace in front of the living room significantly reduces the amount of light - the living rooms are dark. These problems are also found in the apartments in the new Tiger settlement. The new settlement has rows in the direction that is directed to the big road, which follows the course of the river.

4. LEFT BANK OF NISAVA

Figure 4: Krstic's house (Photo and drawing: Mirko Stanimirovic)

Without going into the overall urban design of Pirot, we analysed the urban matrix on the other side of the river. To be respected is a block of semi-detached houses near the sports centre. If we look at the profile straight to Nisava, after the tree line on the rampart there is a street that follows the course of the river. Next to it is an (unarranged) green area and at the end are blocks of houses, which we did not enter into because there are a lot of different concepts. What we want to emphasize is the correct position of the houses concerning the river and communication. The living rooms are far enough away, with a view of the Stara Planina and the tree-lined avenue near Nisava. However, even that planner's idea was not fully implemented. The street towards the city centre does not follow the river, but changes its direction, leaving an unarranged block of houses towards the river. Probably due to the attractiveness of the quay itself, the houses that were built next to the tree line not only endanger the ambiance of the quay but also have a continuation of the

problems of the old settlement of the Tigar factory. Their construction line is much closer to the tree line than in the case of the best settlement in Pirot. The courtyards to the north-east are completely open to public communication. Similar to the initial problem of the old settlement, the intimacy of the living room is completely disturbed. For example, we will take the family detached house built in the past couple of years, the Krstic's house. The authors of this house are architects Andreja Mancic and Aleksandra Ristic. The design and concept of this house deserve a different situation. The value of the modern look of the house is diminished by inadequate urban design. First, the living room is open to communication and the northeast. Probably the authors, aware of the lack of a plot, reduced the openings of the living room. It is to be expected that the house in a green ambiance will be completely open to nature, with large glass surfaces. Second, the position of the yard is questionable for the same reason. It is impossible to achieve its intimate function. It follows the proof of the second part of the initial assumption - good architecture is not so the good urban design gets a lower value. In our opinion, the structure of the lower settlement should have been continued, leaving the distance between the construction line and the quay. In the block created in this way, some citizens are forced to use the quay as a road communication, because their only entrance to the plot is from the quay. This is an additional threat to the environment by the river. It can be concluded that the planner's intention to fix the character of the city does not exist. On the other hand, we could conclude that no apparatus implements the ideas of the profession. Not far from this house is a two-story detached residential building, which was recently designed by architect Nenad Zivkovic. This facility has similar problems.

5. WESTERN QUAY SETTLEMENT

Figure 5: West Quay (Photo: Mirko Stanimirovic)

The residential and business space West Quay is located on the left bank of the Nisava. One building has 34 apartments on 6 above-ground levels. There are mostly business premises on the ground floor, except for the building that is closest to the river, where there are apartments on the ground floor. The entrance to the complex is located next to the shopping centre, while the pedestrian access from the quay is partially paved with the position of the bridge. 4-5 facilities are planned, 2 have been built. The existence of business space is important, which expands the free activities of tenants. For example, people can meet each other in a cafe, not in the living room, which increases the intimacy of the apartment. However, the proximity of communication and the courtyard of the apartments on the ground floor is not a product of decent design. The concept of buildings and settlements is common in the 20th century in Serbia, and we will list some of the problems here. The apartments facing the quay have a good position in terms of views, which cannot be said for apartments whose views are towards the bridge, the factory, or towards the neighboring residential and business buildings. On the other hand, the position of the living room in such apartments is facing northeast, which we cannot assess as a good solution. The concept of the buildings does not correspond to the situation, because the connection with nature should have been achieved for all apartments in a position other than those towards

the river. The position of the complex on the other side of the river would probably be a better solution in terms of sunshine. However, this cannot be the case, as there are no vacant plots. The organization of apartments is like most apartments in Serbia nowadays: living rooms of insufficient width, their wrong orientation, most kitchens are without natural lighting and ventilation, the concept of the apartment is a product of the usual creation of squares and not the comfort of the XXI century. We expect that in the future the price of a square meter of the apartment will be affected by the location and equipment and the quality of the space outside and inside. However, the organized complex is something that we do not meet so often in practice, so within a decent design, this project gained in value with all the flaws that we mentioned. Also, the size of Pirot and the habits of the citizens correspond to this position of the complex.

6. DESIGN PRINCIPLES EVALUATION

The principles created as a set of recommendations look at architectural design as a comprehensive thought, ethical, creative process (Marušić, 1999). The five design principles are: unity of space, ambientization, contextuality, evolution of ideas and professional ethics (Jovanović, 2015). Regarding this topic, it is important to analyze the principles of ambientalization and contextuality. We will conduct a tabular scoring of the described examples. Within the first principle (A), we observe whether the spaces of the apartment and the environment permeate to improve the quality of life. The principle of ambientization (B) in this case refers to the realized public or private purpose of the space of the street, apartment and yard. Within contextualization (C) we observe the interaction of architecture with place. Contextuality in architectural design refers to: cyclical ideas, use of previous experiences, creative interpretation of heritage, application of archetypal forms, enrichment of architectural thought and modernization of experiences (Jovanovic et al, 2018). Within the evolution of ideas (D), we observe the creative processing of an inherited model. Finally, under the fifth principle (E), we condemn the literal taking of ideas from practice. We scored according to the following principle. Within each principle, we rated each of the cases slightly with 0 or 1, depending on whether at least a little was in line with the recommendation.

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Table 1: Design principles

Case	*A*	*B*	*C*	*D*	*E*	*SUM*
The old settlement of Tigar	*1*	*1*	*1*	*0*	*1*	***4***
House in the settlement on the left side of Nisava	*0*	*0*	*0*	*1*	*1*	*2*
West Quay Complex	*0*	*1*	*0*	*0*	*1*	*2*

7. CONCLUSION

Our assumption from the beginning of the research has been proven to be correct. Indeed, the character and shape of the city should be created by experts. Congratulations to the civil engineers, they are necessary factors of every project and construction. But the image of the city should be dealt with by architects and visual artists because their education is subordinated to aesthetics and the development of a sense of creating a composition. It is a completely different matter to implement and plan the City's strategy, which should be done by a team of managers in cooperation with architects. We also advocate the view that any construction in

a public space should be the subject of a public architectural competition. In case someone wants to build a private house on the outskirts of the city, which does not participate in the image of the city from which culture and tourism have some benefits, such a project can be done outside the professional public and according to the rules of the profession. On this occasion, the urban design would be very useful, as the results of our research show - in good urbanism, house architecture gets the value of the whole, because Architecture and urbanism are without boundaries, without division in the design process and division in practice. In other words, the consequences of inappropriate urban design for people's lives are great.

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ICUP2020
international conference on urban planning

ENVIRONMENTAL BENEFITS OF GREEN ROOFS

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ABSTRACT

Valuable green spaces in urban areas are most often replaced with concrete paving and buildings, which destroys natural habitats. Along with the change in people's attitudes towards the natural environment, the development of green roof structures was encouraged. A green roof represents a well-known passive design system that is wholly or partially covered with vegetation planted over a growing medium. It protects the waterproofing membrane and thus prolongs the life of the roof structure. In addition to economic and social benefits, it is crucial to point out the undeniable environmental contributions that these constructions provide us. Precise knowledge of the environmental benefits of green roofs is essential for anyone who cares about the environment. Green roofs have proven to be one of the best choices in urban areas since they provide compensation for occupied spaces. This paper aims to emphasize the importance of environmental benefits. Through an overview of the benefits related to the use of ecological materials, energy consumption reduction, urban heat island effect, reduction of carbon footprints, water management, sound absorption, as well as ecological preservation, authors give a brief review of the environmental benefits of green roofs.

Keywords: *green roof; environmental benefits; energy consumption and carbon footprints reduction; urban heat island effect; water management*

1. INTRODUCTION

Green roof systems are representative of green architecture, which has received more attention in the last few decades [1]. The application of the green roof construction implies a combination of engineering and natural sciences, which is why it has been attracting more attention in recent decades [2]. The only way for quality implementation of green roofs is based on a multidisciplinary approach and a comprehensive view of the influencing factors. Cooperation between citizens, ecologists, architects, urban planners, and industry enables the perception of new urban ecosystems and their potential use within the public network [3]. For the design and construction of green roofs, it is necessary to have information on the historical development and possible solutions useful for designers, investors, and local companies, on the immediate environment,

technical solutions, as well as on constructive details and maintenance [4,5]. In general, there were no significant sources of literature in this field until the 1980s. Books published in the second half of the 20th century, with several adequate positive examples from practice, describe more detailed the construction and application of green roofs. Steven Peck, in the book Award Winning Green Roof Designs, gives an overview of plant species, substrates, drainage, irrigation systems, and hydro isolation, as well as the challenges and difficulties that everyone must be aware of when designing these systems. Green roofs have proven to be one of the best choices in urban areas since they provide compensation for occupied spaces. This paper aims to emphasize the importance of environmental benefits. Through an overview of the benefits related to the use of ecological materials, energy consumption reduction, urban heat island effect, reduction of carbon footprints, water management, sound absorption, as well as ecological preservation, authors give a brief review of the environmental benefits of green roofs.

2. BENEFITS OF APPLYING GREEN ROOF SYSTEMS

Relevant benefits can, in considerable measure, influence the decision to apply a green roof construction. Christian Werthmann provides a rich source of information on the historical, methodological, and constructive characteristics of green roofs suitable for people with different levels of knowledge [6]. It is not the same whether the roof will be a gathering place for people and only have the role of improving the visual aspect, or it will be favorable for ecological reasons and preservation of the natural environment. The modern variant of green roof construction is in use all over the world, and their structure and benefits vary depending on climate conditions, culture, or various other restrictions. Nowadays, green roofs are viewed through the prism of their economic, environmental, and social benefits. Among the functional benefits of green roofs, most significant are improved insulation, energy savings, and increased comfort, while users have personal benefits such as space for recreation, rest, and mental relaxation. Planning, designing, and development of technologies and materials used for the construction of the green roof are directed toward sustainability. Based on the literature review on the number of publications with the topic of green roofs [7] papers investigating the impact of vegetation make 36%, papers on energy impact 27%. In comparison, papers related to atmospheric water management are about 20%. On the other hand, papers about sustainable design with a share of 8%, irrigation with 5%, and applied materials with 4% indicate the need for additional research.

3. ENVIRONMENTAL BENEFITS OF GREEN ROOFS

On the roofs are often installed solar panels and rainwater tanks, which contribute to the longer life of the roof structure layers. Following technological development and raising awareness about preserving the natural environment and energy-saving, the famous "roof gardens" are essential not only for their aesthetic function but also for improving the thermophysical and acoustic characteristics of roofs. Green roofs are one of the best strategies for "healing" the urban environment [8]. However, some advantages are noticeable only if this system is applied to a large number of roofs. Green roofs represent a necessary element in preserving the environment [9]. Different measurement results related to the functioning of green roofs indicate the need to conduct research and long-term monitoring of the performance of these systems in urban areas [10]. Numerous benefits such as additional thermal insulation, reduced energy consumption and emissions of harmful gases into the atmosphere, extended membrane life, reduction of urban heat islands, air purification are just some of the environmental benefits provided by these constructions [11].

3.1. Energy consumption reduction

Research of thermal properties and energy characteristics of green roofs can be realized in two phases -by measuring the air temperature in indoor and outdoor spaces of the building in which the green roof is installed in the first phase. In contrast, in the second phase, the thermal characteristics of the green roof, as well as energy savings, would be examined using a mathematical approach. During a typical summer day, during periods when the air conditioners were not working, the indoor air temperature in a building with a green roof was measured, whereby the temperature did not exceed 30^{o}C [12]. Improvement of interior air temperature by implementing green roof structures instead of a conventional roof can lead to a decrease in cooling and heating energy consumption. By applying these constructions, due to the reduced energy consumption in the periods of the most significant need for providing thermal comfort, energy savings have been achieved [8].

The ecological advantages of green roofs do not only apply to new buildings. Considering that green roofs have better performance in buildings that were without thermal insulation of adequate thickness, their importance in the renovation of old buildings is much more noticeable than in new, well-insulated buildings [13,14].

Compared to conventional roofs, green roof systems provide considerable savings for cooling energy because of the additional effect of evapotranspiration [15]. Saadatian et al. [16] gave an overview of strategies for the application of these constructions through an analysis of economic and technical properties, as well as energy characteristics of green roofs. Green roofs can reduce the need for cooling by 32-100%, while their application can reduce the roof temperature by 50°C, which confirms the importance of the energy aspect of these systems. Extensive green roofs can be an excellent way to save energy during the summer in the continental Mediterranean climate. **Figure** 1 shows an approximate representation of temperature oscillation of the conventional reference roof and the green roof, in the case when it was irrigated and when it was not irrigated.

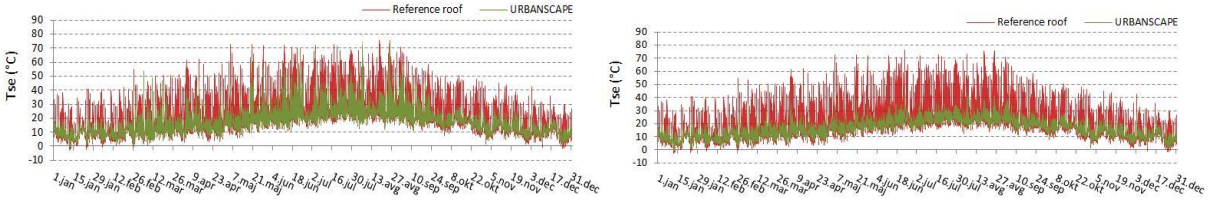

Figure 1- Comparative representation of temperature oscillation of the conventional reference roof and the non-irrigated green roof (left) and irrigated green roof (right)[17]

3.2. Decrease of the Urban heat island

In addition to the direct benefits for the roof construction and the building, green roofs contribute to the cooling of the immediate environment. It is possible to achieve significant savings at the municipal level, which is one of the most effective ways to reduce the ambient air temperature in urban areas. In summer, temperatures in cities are approximately 5-7°C higher compared to the countryside, because buildings and roads absorb heat. The temperature on a traditional roof can be up to 40°C higher compared to a green roof. Because of the intensification of urban heat islands and the emergence of the phenomenon of global warming, efficient regulation by implementing green roofs becomes a necessity [18]. The evaporation process achieves the improvement of microclimatic conditions. Namely, atmospheric waters retain in the green roof and cool the environment during the evaporation process. Depending on the time of year, the use of green roofs can contribute to reducing the air temperature between 0,5°C and 2°C [8].

Albedo is a measure of the reflectivity of surfaces or bodies and represents the ratio of reflected electromagnetic radiation and radiation that falls on the body. Technologies with aim to increase albedo in cities and the application of vegetative green roofs represent a relatively significant potential for mitigating thermal islands. The application of these technologies on a city scale is essential [19]. High albedo, in combination with insulation, provides an overall benefit in terms of mitigating urban overheating and energy transfer in buildings.

The results of a comparative analysis of the insulation characteristics, radiation, and energy balance of the surface layer of four experimental roof systems, including the extensive green roof with the Sedum plant layer and the cold uninsulated roof in Melbourne, Australia, indicate that cold roofs, combined with thermal insulation, provide the highest overall benefit in terms of mitigating urban overheating and energy transmission in buildings [20]. Both white and green roofs have less effect on thermal resistance, the biological activity of plants, and the Albedo effect compared to black roofs [21]. Conversion of black roofs to white or green roofs can have positive effects not only on a micro-level but also on an urban scale.

Cold roofs represent roof surfaces that reflect solar radiation while reducing heat transfer in the building. The two essential characteristics that determine the performance of these roofs are the reflection of solar radiation and heat emission. Conventional cold roofs have a reflection between 0,06 and 0,26, which results in large amounts of heat being transferred inside the building [22]. The effect of urban heat islands results in increased temperature and humidity at night. EPA's Energy Star Roof Products environmental program has established a minimum standard regarding the degree of reflection.

Cold roofs and asphalt in urban areas can increase the average albedo of an urban area by about 0,1. The increase of albedo in urban areas due to the excessive surface area of roofs and asphalt causes harmful radiation around the world. Cold urban areas could contribute to significant energy savings and thus reduce gas emissions that lead to the greenhouse effect by reducing the use of air conditioning [23]. Yang, Wang, and Kaloush [24] studied the impact of reflective materials on the environment from the energy needs of a building on the regional hydroclimate. Potential mitigation of reflective materials depends on many factors, including construction characteristics, urban environment, meteorological and geographical conditions. The optimal

strategy for regulating urban heat islands is best to determine for each city separately, and not based on the generalization and application of a single system.

3.3. Ecological materials and the reduction of carbon footprints

The importance of energy savings by integrating traditional building principles in modern construction practice has prime importance and contributes to improving the energy performance of buildings [25]. The amount of total consumed energy by using alternative building systems can be reduced by up to 50% compared to conventional building systems [26]. The application of green roofs is directly related to the development of new materials and technologies. The use of sustainable materials has brought the question of durability, while the consequences of using much energy for producing some modern materials is a serious issue. Modern materials and technologies facilitate the application of green roofs and solve the problems that existed with traditional roofs.

V. A. Dakwale and Ralegaonkar examined the role of buildings in global CO_2 emissions and gave proposals to reduce greenhouse gas emissions using energy-efficient materials [27]. The components in the construction of green roofs have different effects in terms of reducing energy consumption and environmental impact [16]. The current materials on green roofs need to be replaced with materials that are even more ecological and sustainable. By replacing a part of construction materials whose use harms the environment with some waste or recycled materials, would make the process of building these systems much less harmful. Using recycled tires as a drainage layer in green roofs would replace the use of porous stone materials that are currently in use (such as expanded clay, slate, pumice, and natural pozzolan). It is recommended to use rubber crumbs instead of pozzolan as a material for the drainage layer in extensive green roofs. In this way, the problem of waste tires would also be solved [28]. By using recycled wood and steel constructions, significant energy savings can be achieved, while CO_2 emissions would be reduced. The use of recycled steel saves about 80% of the energy in the production process [27]. Architects should be focused on the most available and most cost-effective materials for whose production the least harmful particles are emitted. The ecological advantages of green roofs can be seen by comparing the emissions of NO_2, SO_2, O_3 and PM_{10} in the process of production of materials for green roofs, such as, e.g., polymers (which are capable of removing green roof pollution) [29]. The production process of low-density polyethylene and polypropylene, in addition to air pollution, has many other adverse effects on the environment. Reduced emissions can neutralize air pollution which occurs during the production process of green roof components during its exploitation.

Improvement of thermal characteristics of the building envelope leads to a reduction in CO_2 emission. Revitalization, reconstruction, and selection of materials with the appropriate U-value contribute to a reduction in CO_2 emissions by 31-36%. Reuse, recycle, and regeneration of energy through combustion, together can save up to 10% of total energy and subsequent emissions of harmful gases [27]. The vegetation layer binds and purifies dust particles and pollutants. Plants on green roofs can absorb airborne particles such as smog, heavy metals, and volatile organic compounds from the local atmosphere, which has a positive effect on air quality and the health of residents. In that way, green roofs help reduce the amount of CO_2 in the air, which is considered one of the most important causes of global warming. One m^2 of green roof per year can absorb 5kg of CO_2. Also, due to lower energy consumption, there is an additional impact on reducing the amount of carbon dioxide by 3.2 kg per year. In perspective, $1m^2$ of a green roof can absorb an amount of CO_2 equal to what would an ordinary car emit while driving 80km [30]. Greening cities, significant green environmental benefits, and environmental protection are expected in the future. Green roofs can mitigate the impact of some of the predicted effects of climate change, such as more intense rainfall and extreme weather conditions. At the same time, increased energy savings are expected as a result of greening roofs [31].

3.4. Water filtration – filter for particles, pollutants and temperature control

Atmospheric water that flows from conventional roofs carries dirt and contaminants, including dissolved solids, organic acids, and turbidity, which all further flows into rivers, streams, and pipelines. Water quality control standards and their impact on the environment, as well as the maximum permissible concentration of harmful particles, are prescribed differently depending on countries. An environmental problem in one country may be quite an acceptable option in other countries. Green roofs purify the atmospheric water that passes through them [32], reducing the runoff of harmful substances they contain [33]. Through natural biofiltration, green roofs prevent pollutants and toxins from entering watercourses. The highest percentage of lead, copper, and cadmium sulfide and about 20% of zinc from rainwater remains in the substrate, which improves the quality of local water. In this way, the costs of pollutant control are reduced [8]. Effective biotreatment of such

substances requires a combination of aerobic and anaerobic processes in different layers, and the extensive green roof is not deep enough to have a layer for anaerobic processing. As for the quality of atmospheric water that flows from the roof, it is evident that the soil or the addition of fertilizers has a significant influence on the content of nutrients. The type and amount of fertilizer are vital elements in the design of substrates in green roofs. Some studies indicate that fertilization can be replaced by water in the dry period, with achieving an equally good aesthetic result. For some plant species, fertilization even gives negative results [10]. Based on the analysis of water runoff from two experimental green roofs with different substrate thickness (6 cm and 16 cm) and a comparison with the reference flat roof, it was concluded that green roofs generally produce higher concentrations of phosphate, carbon, and organic nitrogen. However, fewer metal concentrations from the reference flat roof and these effects are more pronounced on a roof with a thicker layer of the substrate [34].

3.5. Improving urban hydrology through rainwater management

Construction of green roof contributes to the retention of atmospheric water and controls the amount of water that flows through the substrate [35]. Mentens, Raes, and Hermy [36] found that by greening only 10% of roofs in the Brussels, the region would lead to an overall reduction in atmospheric water runoff by 2,7% in the region or over 50% for individual buildings. Green roofs represent a useful tool for reducing rainwater runoff at the municipal level. Lee, Lee, and Han [37] conducted a study where they examined the effects of reducing rainwater runoff through an extensive green roof for four different cases of rainfall. Green roofs are very effective in controlling rainwater runoff, so in addition to being able to retain a large amount of rainwater, they contribute to delay of peak periods in the case of heavy rains. Even during incidental showers, the delay in the runoff of atmospheric water is significant and contributes to the reduction of flood risk. The advantage of green roofs to reduce stormwater runoff contributes to reducing the load on sewer systems by 50-99% in summer. During the summer period, 70-100% of rainwater retains on the green roof, while in the winter period, that amount is between 40-50%. The snow cover is characterized by its property of a poor heat conductor. As such, it protects plants from freezing as a thermal insulator. When the weather gets warmer, the snow must melt first in order for the soil to warm up. Spring melting of snow is the leading cause of elevated water levels at that time of year. Snow cover slows down the wind because of its rough surface.

The ratio of precipitation and atmospheric water runoff from the roof on an annual basis is strictly related to the depth of the green roof substrate. Water accumulated during the precipitation and the initial saturation of the substrate has a significant influence on the functioning of green roofs. Rainwater retention contributes to the reduction of municipal infrastructure costs. A two-year study conducted in Portland [8] showed that extensive green roofs with a 10 cm deep substrate could absorb 69% of all rainwater on an annual basis and even 100% of rainwater during summer days. An extensive green roof retains between 40 and 80 percent of annual rainfall, while an intensive roof retains 80 to 99 percent.

Reducing atmospheric water runoff is a good thing; however, if the construction is not dimensioned correctly, the retention of atmospheric water on the roof could lead to a significant dynamic load of the roof. At existing buildings renovation, it is possible to reduce this load by placing a thin layer of a substrate. However, in this case, a minimal amount of atmospheric water would remain on the roof. If the aim is to strengthen the structure, it will imply more energy and the use of additional material. The more significant amount of water that accumulates on the roof can be a significant problem even due to the smallest imperfections on the hydro isolation. If applied to a large number of buildings, green roofs could have a positive effect on maximum rainwater runoff. In this way, floods at the municipal level could be avoided. In order to see the justification of green roof application, it is essential to perform analysis of the ratio between the amount of atmospheric precipitation that falls on the roof surface and rainwater runoff from various types of roofs, on annual and seasonal levels. Green roofs must be combined with other measures to ensure better overall water runoff and water retention [36]. Although green roofs are most effective in climates with little precipitation [37], some green roofs require additional water for irrigation, which can lead to increased water consumption [16].

3.6. Sound absorption

Green roofs have the potential for sound insulation and noise absorption [38,39]. Because of the high absorption coefficient of the vegetation layer, green roofs decrease the noise level in urban areas. Vegetation should be exposed to the direct urban sound field to be an active absorptive surface. This benefit is even more evident when a green roof is constructed above low buildings [40]. Deep green roofs increase the transmission loss by about 10 dB at 50–2000 Hz, while at higher frequencies, it is increased by about 6 dB [39].

3.7. Ecological preservation

With increased urbanization, ensuring biodiversity is becoming one of the priorities for local communities. Green roofs are very often inaccessible to people, and therefore represent an excellent place for development and preservation of biodiversity. In this way, they can compensate for temporary or permanent living space for plants and animals, which would re-establish the ecological chain interrupted by the city's infrastructure. Green roofs provide habitat for subterranean animals in the substrate, which also contributes to improving urban biodiversity [32]. This benefit is still not sufficiently researched, it is a complex topic, and for its success, it is necessary to follow the guidelines for designing green roofs and improving biodiversity in the urban environment of green roof systems [41].

4. CONCLUSIONS

Architectural design implies the analysis of the characteristics of an area, construction methods, and the most optimal design solutions through the observation of traditional buildings and understanding the real needs of man and his behavior during the use of the building in which he lives. Award-winning green roof projects on residential and commercial buildings, as well as in public spaces around the world, contribute in the best way to strategies for a sustainable and healthy environment. The fact that green roofs are favorable for the renewal of green spaces in urban areas does not justify the negligent destruction of existing green spaces, because green roofs represent a form of environmental compensation and cannot completely replace the natural habitat. It is imperative to consider the percentage of an urban area that could be covered with green roofs, in order to rationally consider the benefit of their application in mitigating rainwater pollution in urban areas. The benefits of applying these constructions for urban climate and overall profit must not be neglected. The conversion of black roofs into green roofs can provide better control of atmospheric water runoff, improve air quality, and increase urban biodiversity at the municipal level.

The benefits of implementing a green roof system are often neglected with the excuse that they are not cost-effective. Ecologically conscientious design is not always the most rational in the financial sense. However, if we look at the lifespan of objects, all the invested effort and money are afterward returned multiple. In addition to economic, these systems also provide environmental, aesthetic, and social benefits, which is why they represent the right choice for many landscape architects around the world. Even though some of the advantages of applying green roofs are not measurable, they have great significance and impact on the living environment. Green roofs give hope to many ecologists, politicians, and architects that the buildings will be sustainable and environmentally friendly in the future. Building regulations, which development depends on the scientific research and existing practice, can significantly contribute to defining guidelines for the use of green roof systems.

ACKNOWLEDGMENTS

This paper has been written as part of a national project implemented at the University of Niš, financed by the Ministry of Science and Technological Development of the Republic of Serbia 2011–2019: ‘Construction of student dormitories in Serbia at the beginning of 21. century’, No. 036037.

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KINETIC FACADES AS ELEMENTS OF CONTEMPORARY AND SUSTAINABLE ARCHITECTURE

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ABSTRACT

Throughout history, different directions in architecture have developed, so the design of the facades of buildings has changed and progressed. As technology has advanced, facades have transformed, and preserving the environment has become increasingly important. Contemporary technology has enabled designers to develop an architecture that responds to stimuli from the environment and adapts to them. As a special form of modern and adaptive architecture, the paper considers kinetic facades - architectural facades that change dynamically, transforming buildings from static monoliths into constantly moving surfaces. This design makes it possible to achieve sustainability and energy efficiency, as well as additional user comfort within the building. Kinetic facades can be considered as one of the optimal options in managing the interactions between the exterior and interior of the building. In addition to representing an element of smart buildings, such facades allow for the flexibility of architectural design. The paper analyzes different systems of kinetic facades, the main advantages they provide in terms of sustainability and environmental design. In addition, some of the most representative examples of buildings have been singled out, where a balance has been achieved both in design and in terms of environmental protection. The aim of this paper is to present the advantages and significance of the application of modern design methods in architecture through the example of adaptive facades.

Keywords: *kinetic facades; kinetic architecture; sustainability; adaptive facades; contemporary architecture*

1. INTRODUCTION

Despite various changes in terms of economic, cultural, technological and energy parameters over time, one of the basic tasks of architecture is to create a comfortable "shelter". A building provides protection to the users of the space from external influences, while the building envelope is one of the primary subsystems that can be designed to attain an appropriate level of energy efficiency and comfort within the building.

Structures are affected by numerous natural and created factors that are not static, but dynamic. Therefore, it is important to improve the facilities so that they can adapt to changes in different conditions. One of the ways to achieve this goal are adaptive facades. 'Adaptive façades, in particular, consist of multifunctional, highly adaptive systems, in which the physical separator between the interior and exterior space is able to change its

functions, features, or behaviour over time in response to transient performance requirements and boundary conditions, with the aim of improving the overall building performances [4].' The interest in interactive and intelligent architecture emerged intensively in the period of the sixties and seventies of the previous century. The significant shift of ideas and principles in architecture coincides with advances in computing, cybernetics and building technology, and kinetic and dynamic form is increasingly used. In 1970, Zuk and Clark defined kinetic architecture as an architectural form that can be inherently displaceable, deformable, expandable, or capable of movement. To elaborate, a kinetic façade is a technological system in which there is a certain kind of motion and that is able to guarantee variable locations or mobility and/or variable geometry to all or one of its parts [10]. Kinetic facades are adaptable, responsive to natural and created influences by providing optimal building performance and user comfort. These types of facades are complex, they need to be effectively adapted to restrictive conditions such as climatic conditions, different locations, functional requirements. What is necessary is the driving force that generates movement.

The paper explains in more detail the concept of kinetic facades, as well as various design parameters that achieve the sustainability of a building and user comfort. The basic division of the system and types of these facades is given, with an overview of examples of constructed buildings. The aim of this paper is to present the advantages and significance of the application of modern design methods in architecture through the example of adaptive facades

2. ADAPTIVE FACADES

Adaptation is an evolutionary process in which an organism becomes more capable of living in a certain habitat [5]. As previously mentioned, the building itself is often associated with the "shelter" function, while the building envelope is defined as an enclosure, separating the interior and exterior, providing certain functions. However, in the case of modern adaptive facades, these views change; what developed is the interest in building envelopes as an interface (medium) rather than as a partition.

Living environment continuously changes, new problems occur and they require solving. Some of the basic environmental influences on a building and its users are light, temperature, relative humidity, precipitation, wind, air pollution and noise. Most of the existing conventional facades are static, do not adapt to external conditions, and there is a large consumption of energy in order to achieve optimal comfort. As the issue of energy efficiency of buildings is very topical in the world, in recent decades it has been actively worked on the development of new experimental systems of smart construction, as well as adaptive facades. They represent a new generation of cladding systems aimed at reducing the energy consumption of buildings, as well as improving the comfort and sustainability of cities. This is achieved owing to their ability to change their behavior in real time in accordance with internal and external parameters, using systems, components and materials. In this way, the building becomes a dynamic system that adapts to the context of the environment in order to achieve an energy balance for smooth functioning, almost like a living organism. In the past decades, several types of adaptive facades have been developed, while kinetic or dynamic facades have been specially treated in this paper.

2.1. The notion and concept of kinetic (dynamic) facades

The term kinetic originates from the Greek word kinesis, indicating motion, movement or the act of moving. Kinetic architecture refers to the integration of a certain degree of movement within the structural design. Kinetic architecture can be defined as structures or parts of structures of variable mobility, location or geometry [11]. As a special segment of kinetic architecture, kinetic facades are analyzed in more detail in the paper. New generations of kinetic facades, where aesthetics and communication are integrated into the design and construction of the building, are becoming more and more common. By creating a real relationship between people, the digital world and the architectural space, such facades have the potential to completely transform the urban landscape [11].

As the previously mentioned notion of adaptive facades is complex and the subtypes of these facades themselves cannot always be clearly distinguished, in addition to the notion of kinetic facades, the notion of dynamic facades also appears in a very similar context. Dynamic facades are 'facades with the ability to respond to their environment by either typological change of material properties that alter the overall form or local alteration by regulating their energy consumption to reflect the environmental conditions that surrounds it' [6]. The term 'dynamic' in architecture is described as the ability of artificial and natural systems to adapt to changing environmental conditions. Thus, in this particular case, the façade refers to the interaction between

the external conditions and the façade systems themselves [12]. An analysis of the factors influencing the design of these systems is given in the next chapter.

The facade as the most visible part of the building is one of the most important elements of a building. As mentioned above, the building envelope exchanges energy with the external environment, which can be used to improve energy performance. Traditionally, the design of the facade is static, and such facades are not able to adapt and respond to the various changes to which they are exposed. According to the project of The IEA EBC Program, the development, application and implementation of kinetic facades enables a necessary step towards creating improvements in the energy efficiency of built environments [9].

The concept of kinetic facades is based on movement, i.e. on the geometric transformation in space that affects the change of state, characteristics of materials, physical structure of the facade itself without compromising the overall structural integrity. The application of kinetic facades improves the aesthetic qualities of the building, the response of the building to changes in environmental conditions, and performs functions that would be impossible for static facades. Thanks to the mobility of these facades, the surface of the building changes so that it creates the effect of 'skin-like articulation', which encourages the idea that the building envelope is an active system, and not just a static divider. The systems used can regulate the level of lighting, ventilation, i.e. air flow, energy, and even information. In order to improve performance and efficiency, the moving elements of the facade can be programmed to respond to various stimuli such as climatic and other environmental factors, weather (time) and many others. The design and construction of kinetic facades is increasingly available thanks to advances in the development of sensors, materials, building management technologies [2].

Biomimicry often figures as a possible source of inspiration in the concept of kinetic facades. The terms biomimicry and biomimetics come from the Greek words bios, meaning life, and mimesis, meaning to imitate. Biomimetics is defined as the 'abstraction of good design from nature' or 'mimicking the functional basis of biological forms, processes and systems to produce sustainable solutions' [biomimetic]. As nature uses the logic of material systems, the analysis of functional phenomena in nature can develop ideas for the application of certain functions, dependencies and characteristics in technology. The potential for transmission and application of biological solutions in construction is huge [1].

2.2. Design parameters aimed at sustainability and positive impact on the user comfort

The concept of kinetic facades is not new, however, more intensive development and application of these facades have been present in recent years. As more and more work is being done on the problem of sustainability of construction and facilities, and the creation of the most favorable conditions for the living and habitation of users, it is necessary to consider certain parameters during the design process. The following are the parameters that should be taken into account when designing facades, each of which has the potential to define the character of the building and affect its overall perception [6]:

Sunlight control and natural lighting are very important both because of the thermal comfort of the user and the view, and because of the reduction of the need for artificial lighting. With the help of shading, that is, shading elements that can be integrated into the facade itself, the amount of sunlight can be controlled, which achieves thermal comfort and the appropriate degree of illumination of the space. By controlling the shading or natural lighting, it also provides the connection with the environment. The application of glass surfaces and movable panels that open the space to the outside, influences the psychological aspect of the user and the connection between the interior and the exterior.

The building envelope plays a very important role in terms of ventilation control and natural ventilation. By adjusting and applying the appropriate elements on the facade, the optimal air flow is achieved. This can be solved by simple, small systems such as shutters that allow air circulation or more mechanically complex systems that direct fresh air into the building.

Thermal insulation systems that are properly integrated into the building envelope reduce energy consumption, as well as the comfort of users of the space throughout the year. Thanks to the development of modern materials, the problem of thermal insulation can be solved in several ways depending on the problem.

Materials have a significant aesthetic and systemic role in the design of facades. The choice of appropriate materials achieves the specific character of the building, affects the result of the external appearance of the building, as well as the proper functioning of the system and the comfort of the building. Also, applying

appropriate materials on the building envelope, protects the facade from other external influences such as precipitation and moisture.

Structural efficiency and construction of the building must not be compromised. As mentioned earlier, one of the main characteristics of kinetic and dynamic facades is the mobility of the facade elements without negative effects on the overall structure of the building. In the case of these facades and systems, structural elements can also be a very significant decorative and aesthetic element.

In addition to saving energy thanks to some of the previously mentioned systems, the facade can be designed so that it itself becomes an energy generator. Modern solar systems such as photovoltaic and flexible thin solar films, which are integrated into the facade, allow simultaneous power generation and shading of the building.

In order to really improve the design of facades in terms of sustainability and durability of the building, the design must be approached responsibly, goal-oriented with a high level of technical and creative skills. When constructing facades, in order to use their full potential, it is important to observe the structural, functional, aesthetic and environmental aspects [6]. In the advanced chapter, a brief overview of the basic division of systems and types of kinetic facades is given.

2.3. Systems and types of kinetic (dynamic) facades

Adaptive facades refer to multifunctional facade systems that can change their performance and behavior in real time. The basic division of adaptive facade systems, which can be directly applied to kinetic facade systems depending on the way they are managed, is presented in Figure 1. These systems can be divided into responsive, reactive, interactive and autoreactive systems [8].

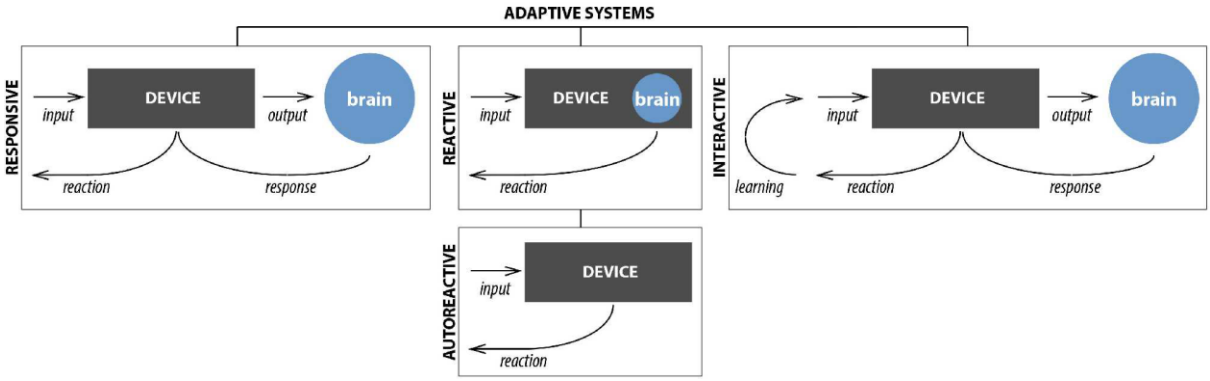

Figure 1: Schematic of adaptive systems [8]

Dynamic and kinetic facades imply the mobility of their segments, whereby these parts can be controlled in several ways and levels. Some of the possible approaches are the 'whole building' approach with a centralized management system, then floor-level management, or actuators on individual façade elements that can be operated by users or be self-reactive. Building Management Systems are used in computer-controlled facades to manage conditions inside the building with the help of information from sensors located on the facade. These sensors detect various influences such as light levels, heat, wind speed, air quality [7]. Shading devices are a very important segment of kinetic facades; they can be connected to a central system that follows the solar path and moves the curtains in order to continuously maintain comfort inside the building. Automated blinds can react to the level of natural light and the angle of incidence of the sun, and the slats can be oriented so as to reduce glare while letting through the appropriate amount of daylight. Thanks to these systems, energy consumption can be reduced by 30% [3]. As mentioned in the previous chapter, natural ventilation can be controlled with the help of dynamic facades. The openings that are integrated into the facade itself and its elements can be opened or closed depending on the sensor that registers the air quality and temperature inside the building. Also, the already mentioned solar collector systems on facades can harvest solar energy which is later used for various purposes.

Based on teh key influential factors on the facade design, a classification into the basic types can be made [2,6]:

- User Control Kinetic Facade,
- Light Control Kinetic Facade,
- Energy Control Kinetic Facade,

- Wind Responsive Kinetic Facade.

A brief analysis and review of the chosen buildings deal with the implemented systems and types of kinetic facades.

3. IMPLEMENTATION OF KINETIC FACADES – REVIEW OF CHOSEN EXAMPLES

Arab World Institute is the structure built in Paris (France) in 1987, and it was designed by the Atelier Jean Nouvel. The southern facade of the building is covered by the power-actuated hexagonal lenses, Figure 2 (a). Their design takes after the 'mashrabiya', lattice-work motif of Arabic architecture which provides partial shading and privacy while permitting view, Figure 2 (b). The geometrical series is a combination of hi-tech photosensitive mechanical devices consisting of 30 000 diaphragms on 1600 elements supported on the frame of stainless steel, aluminium and glass. By using the photovoltaic cells and using a central computer system, the light levels (10-30%) can be adjusted, as well as transparency, similar to the camera lens. The devices automatically adjust their openness / closeness every hour to match the outdoor changing light levels with the desired interior light level, filtering light in and out of the building throughout the day, Figure 2 (c). Although the facade was designed with the goal of exploring light, reflections, contours and shadow, the concept itself can be implement as a shading system with the tendency to reduce the cooling system workload [1].

(a) (b) (c)

Figure 2: Arab World Institute: (a) Southern facade, (b) Basic elements modelled after mashrabiya, (c) Hi-tech photosensitive mechanical devices
(Source: https://www.archdaily.com/162101/ad-classics-institut-du-monde-arabe-jean-nouvel)

Articulated Cloud is situated in (USA); it was built in 2004 and designed by Ned Kahn and Koning Eizenberg Architecture, Figure 3. (a). The building façade transforms into a wind sculpture owing to 43 000 individual lightweight plastic elements affixed on a steel frame screen, Figure 3 (b). Composed of thousands of white squares moving in the wind, Figure 3 (c), envelope of this building appears as a digitalized cloud. The optical qualities of the envelope vary depending on weather and time of day [1].

(a) (b) (c)

Figure 3: Articulated Cloud: (a) Façade of the building resembling a digitalized cloud, (b) Lightweight elements supported by a steel structure, (c) Transparent white squares of polymer
(Source: http://nedkahn.com/portfolio/articulated-cloud)

Campus Kolding, built in 2014 in Kolding (Denmark), was designed by Henning Larsen Architects, Figure 4 (a). The building façade consists of 1600 perforated steel shading panels. These triangular shaped solar shading

devices are controlled by sensors that monitor light and heat levels around the building, adjusting themselves by either opening or closing automatically, Figure 4 (b). Sensors monitor heat and light levels around the building, allowing the facade panels to shift from open to half-open to fully open. This system provides the optimum light and thermal user comfort. The building features a number of sustainable features, for instance cooling by means of water from Kolding River, mechanical low-energy ventilation and solar cells [1].

(a) (b)

Figure 4: Campus Kolding: (a) Building façade with characteristic perforated elements, (b) Screens which open and close as needed (Source: http://arcdog.com/portfolio/sdu-university-of-southern-denmark-campus-kolding/)

One of the most famous examples of kinetic facades are Al Bahar Towers in Abu Dhabi (AE), Figure 5 (a). They were built in 2012 and the design was produced by Aedas Architects, Ltd. As in the Arab World Institute the main inspiration for the façade elements was the traditional Islamic motif 'mashrabiya'. The 'mashrabiya' at Al Bahar Towers comprises a series of transparent umbrella-like components that open and close in response to the sun's path. Each of the two towers comprises over 1.000 individual shading devices that are controlled via the Building Management System, creating an intelligent façade, Figure 5 (b). The tower curtain wall is comprised of unitized panels separated from the kinetic shading system through a substructure by means of movement joints. The dynamic shading system is a screen comprised of triangulate units such as origami umbrellas, Figure 5 (c). The triangular units act as individual shading devices that unfold to various angles in response to the sun's movement in order to obstruct the direct solar radiation [1].

(a) (b) (c)

Figure 5: Al Bahar Towers: (a) View of the towers, (b) Each of the towers has over 1000 individual shading devices, (c) Triangular elements on the façade like the origami umbrella
(Source: https://www.designboom.com/architecture/aedas-al-bahar-towers/)

Thyssenkrupp Quarter u Essen (DE) was designed in 2010 by JSWD Architekten + Chaix & Morel et Associés, Figure 6 (a). The exterior of the structures is clad in steel sheets of incomplete texture. The Headquarter façades have metallic sun shades which are comparable to vertical moveable feathers, Figure 6 (b). These feathers consist of an axis with two series of horizontal slats on either side; the «barbs» enable the amount of sunlight entering the building to be regulated. When the barbs of the two neighbouring feathers are open they can crisscross each other and superimpose themselves to allow a maximum amount of sunlight to enter the building, Figure 6 (c). Around 400 000 of centrally controlled slats offer protection from sunlight, without obstructing the view. The primary parameter setting the façade system in motion is the outdoor air temperature [1].

(a) (b) (c)

Figure 6**:** Thyssenkrupp Quarter: (a) The view of the Headquarter , (b) Metal screens resembling feathers, (c) Appropriate feather position provides maximum comfort
(Source: https://www.archdaily.com/326747/q1-thyssenkrupp-quarter-essen-jswd-architekten-chaix-morel-et-associes)

4. CONCLUSION

The paper presents the main characteristics of adaptive facades with special reference to kinetic facades. The concept of these facades is explained in more detail, as well as the basic systems and typology. Considering the importance and topicality of sustainability in construction, the most important parameters that should be paid attention to when designing facades are listed. Based on a brief analysis of selected examples, a wide range of applications of kinetic facades and a variety of systems that adapt to different environmental conditions can be seen. It can be concluded that the envelopes of buildings play a significant role in the energy efficiency of buildings and the comfort of space. They are most often used in the form of shading systems, with the regulation of natural ventilation and temperature inside buildings. Due to advances in technology and materials, kinetic facades can evoke a strong and unique aesthetic impression. Adaptive facades as an element of modern architecture provide the potential for permanent progress in terms of development of building skins.

ACKNOWLEDGEMENTS

This research is supported by the Ministry of education, science and technological development of the Republic of Serbia for project cycle 2011-2020, within the framework of the projects TR 36045 and TR36017.

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REVEALING NATURE THROUGH PLAY IN URBAN DESIGN EDUCATION

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ABSTRACT

The challenge for urban design today is to help development of the healthy, vital, sustainable and resilient cities in which humans and nature flourish together. Consequently, urban design education needs to help future architects and urbanists to develop knowledge, skills and awareness to create more ecologically sensible urban settings. Assuming that effective design helps inform us of our place within the nature, Sim Van der Ryn and Stuart Cowan ask designers to "Make nature visible" in order to bring the designed environments back to life and to activate our potential for learning.

Based on the analysis of the students' works (design projects, artefacts and portfolios) from Ecological Urban Design Studio at University of Belgrade Faculty of Architecture, this study explores: How can design of the playground help students rethink the relation between man and nature, and create places where urban nature is revealed and enjoyed? We argue that "the play" as concept and "learning by doing" as methodology together have a potential to help students develop ecological awareness.

Keywords: *nature; urban design education; ecological design; play; learning by doing*

1. INTROUCTION

In order to respond to contemporary environmental problems, there is an urgent need to start planning, designing and building more ecologically sensible urban settings as a prerequisite for more sustainable and resilient cities and urban life. In that context, the challenge for the discipline of urban design today is to help building and developing more healthy and vital cities in which humans and nature can flourish together.

In parallel to transformation of practice, urban design education needs to be transformed so that it simultaneously enable development of the professional but also the ecological/environmental knowledge, skills and awareness. There is a growing body of knowledge in this field (Altomonte, 2012; Mostafavi and Doherty 2010; Elin 2006) that explores possible ways of transforming urban design education towards sustainability.

This paper aims to contribute to this body o research by presenting and discussing the experiences and the results from the educational experiments conducted in the form of workshops as a part of Ecological Urban Design Studio at Master of Architecture program at the University of Belgrade faculty of Architecture. The work in studio builds upon theories and principles of ecological urbanism, and uses active learning methods in order to help students gain knowledge, skills and abilities for designing ecologically sound urban environments. The role of the workshop in this educational process is to focus on concrete design tasks, to test basic ideas and to reflect upon them as a part of the learning cycle in their project development. Based on the assumption that

"the play" as concept and "learning by doing" as methodology together have a potential to help develop ecological awareness, students were exploring potential of play (as concept, activity and design problem) to help them rethink the relation between man and nature, and to create places where urban nature is revealed and enjoyed.

2. ECOLOGICAL URBANISM AND DESIGN

At the beginning of the 21st century, due to global recognition of environmental crisis, and the role that cities play in it, "ecology" became a buzzword for urban development and "re-imaging" the cities. But, how we conceptualise ecology in relation to urban, shapes the way it is integrated in urban planning and design theory and practice, which consequently, shape our urban environment. This is important because urban theorists recognize that "one size fits for all" approach sometimes bring uniformity and unitarism to planning and design. They also indicate the problem of seeing "ecology" as a solution that leads to uniformity and lack of acceptance in local context (Zivkovic et al., 2012)

Therefore, it becomes important to understand how to integrate ecology and urban design to enable creative and contextual approach to achieve complex urban qualities in plural societies. The ecological urbanism as concept and project draws from ecology to inspire urbanism that is more socially inclusive and sensitive to the environment and at the same time less ideologically driven than green or sustainable urbanism. It seeks for new ethics and aesthetics of the urban (Mostafavi and Doherty, 2010).

In parallel, theory of ecological design (Van der Ryn and Cowan, 1996:17) suggests that the problem of unsustainable urban condition is caused by lack of integration between two interpenetrating worlds in which we live in: the living world and "world of roads and cities, farms and artifacts, that people have been designing for themselves". For them, thinking ecologically about design is "a way of strengthening the weave that links nature and culture" (18). Ecological design is in that sense effective adaptation and integration with nature's processes and is based on five principles:

- *Solutions grow from place*, meaning that ecological design begins with the intimate knowledge of a particular place;
- *Ecological accounting informs design*, suggesting the importance to trace the environmental impacts of existing or proposed design,
- *Design with nature*, meaning that by working with living processes, we respect the needs of all secies while meeting our own;
- *Everyone is a designer*, implying that it is important to listen to every voice in design process and overcome the division between participants (users) and designers (professionals).
- *Make nature visible* in order to bring the designed environments back to life and to activate our potential for learning;

The questions that remains is *how to educate* future professionals to develop ecological awareness and integrate ecological knowledge with urban design professional skills in order to be able to produce urban settings in which nature and culture can flourish together in many different ways. We assume that the concept of play and learning by doing as educational approach have potential to help achieve this goal – and specifically focus on its implementation in "making nature visible".

3. PLAY AS A TOOL IN URBAN DESIGN EDUCATION: LEARNING BY DOING

3.1. Play as concept and tool in education

In the philosophy and sociology of everyday life, *play* occupies an important place as an integrative aspect of life and a specific field of possibilities (Živković, 2015). Play is one of the basic phenomena of human existence that permeates and reflects all other domains of life. Understanding play as a "celebration of existence", everyday life draws strength, serenity, joy and understanding from it (Fink and Elaković, 2006: 53).

The PLAY can also be understood as a metaphor and expression of human freedom and choice. To the question "Do we play because we have free time or do we have free time because we play?" Fink answers that only a play has "free time", more precisely, we have free time "if and while we play" (Fink and Elaković, 2006: 53). Although *play is a natural way of life for children*, in the world of adults the function of play depends on how free people can really be to realize their abilities in real life. "That is why the fight against alienation also

becomes a fight to play again. We need to win back the play, which is not a role-playing game, it is not an illusion that replaces life, but an organized part of the won freedom "(Heller, 1978: 355).

Besides that, gathering and connecting the character of play makes it a social amalgam. Playing a game activates and connects participants and observers on the basis of choice. Traditional games and parties imply active participation of those present , and have the function of establishing and consolidating common values. In that way, they contribute to maintaining a high degree of community sociability (Božović, 2007: 108).

Linking play theories with architecture and urban design is recent phenomena. The exhibition "The Good Life: New Public Spaces For Recreation", organised in New York by Van Allen Institute, explored how architects, designers, landscape architects, and artists are reinventing urban public spaces and stressed that "in our increasingly dense cities, recreational and play spaces are vital to achieving healthy and sustainable cities and are at the core of new urban planning and design initiatives" (Ryan, 2006:10).

Although play based learning is well developed concept in children's education, it is not explored enough at academic level. The seminal work in architecture and urban design field is "Play as a Design Tool" by Lian Lefaivre and Henk Doll (2007) builds upon work of Aldo Van Eyck on playground, research places of play in modern cities, and propose PIP model as a tool for urban design. In Serbian context, the important contribution to the topic has been made by Ana Nikezić who explored the relation between landsapes, play and architecture in architectural design studio (Nikezić, 2012). Our work seeks to contribute to this line of the research in the field of urban design education.

3.2. Urban design education goals and formats

Expected learning outcomes of urban design education are the development of student's awareness, knowledge, skill and abilities in relation to urban space. Teaching urban design is grounded in Bloom's educational objectives, according to which any given learning task favours one of three psychological domains: a) cognitive, that revolves around knowledge, comprehension, and critical thinking; b) psychomotor, that involves manipulative or physical skills; and c) affective, that describes the way people react emotionally, and relates to development of values, appreciation, empathy, and attitudes that result from the learning process (Milovanović - Rodić et al. 2013).

Urban design education is generally performed through four main educational formats: seminar, studio, elective courses and workshops. Although learning about cities and urban design theories (through transmission teaching model) mostly happens in seminars, basic unit in most bachelor and master urban design academic programs is urban design studio. Education in studio aims to link theory and practice, and is focused on developing specific, awareness, skills and abilities in urban design. Besides seminars and studios, smaller, elective courses and workshops are widely used as an opportunity to apply problem-based learning approaches that teaches not only the facts but also the relevant thinking strategies (Altomonte 2012).

3.3. Workshop as a context for "Learning by doing" urban design

Workshops are spatially localised and material events that can be organised in many forms and produce many positive outcomes. They can be conceptualised as places for cooperative learning but also a technique that supports dialog through which different perspectives on issue under investigation emerge and confront. They are settings and events that enable sharing experiences and exchange of knowledge through which new ideas and solutions may emerge. Besides that, they create situations for team-work and cooperation through which new relations may be constructed (Živković et al. 2018b).

As a learning format, workshops are based on the concept of "Learning by doing", meaning learning from experiences resulting directly from one's own actions. The concept is based on the idea that actions do not only follow thinking – they induce thinking. The thinking generated from action is relative to the action, and this forms the essence of experiential learning. It is contrasted with learning from listening lectures, reading instructions or watching others perform, but it does not replace traditional methods of learning. Instead, experiential learning tasks should be designed to improve students's understanding of problem, by giving them the freedom to explore and find the learning path that is most suitable for them (Reese, 2011).

The concept of "learning by doing" is usually associated to John Dewey's theory of experience in which he advocated that education should be based upon the quality of learning experience. Based on Dewey's work, David Kolb builds Experiential Learning Theory (ELB) and suggests that a person would learn the best through discovery and experience. He provides holistic model of learning process – Experiential learning cycle that

consists of four stages: 1) Concrete experience - Learning cycle begins with doing something in which the individual or team are assigned a task. 2) Reflective observation - stepping back from the task and reviewing what has been done and experienced, 3) Abstract conceptualization - as a process of making sense of what has happened that involves interpreting the events and understanding the relationships between them, and 4) Active experimentation in which learner considers how he/she is going to put what they have learnt into practice (Kolb, 1984). This approach has been used as a theoretical background for education in ecological urban design studio and workshop that will be presented and discussed in the next section.

4. PEDAGOGICAL EXPERIMENTS IN URBAN DESIGN STUDIO: REVEALING NATURE THROUGH PLAY

4.1. WORKSHOP: Make Nature visible!

The workshop is a part of Ecological Urban Design Studio that is organised through 3 inter-related modules: project, seminar and workshop. Studio encompasses theoretical and practical lessons and tasks for group and individual work. Ecological Urban Design Studio is designed to enable students to acquire complex and deep awareness, knowledge, skills and abilities in order to design place based ecological urban design project. Project, seminar and workshop are organised as a complex system of abstract (theoretical) and experiential learning cycles (Kolb, 1984), that combine research and design phases and weave together to help students produce design project at different spatial scales, and gain wider knowledge, skills and awareness on urban design and environmental issues (Živković and Lalović, 2018).

In that sense, general educational role of the workshop is to help students acquiring additional knowledge and skills through individual practical experience, about practical procedures that influence the quality of the project; developing creativity and ability to quickly and efficiently make design decisions and reflect upon results. In addition, specific goal of Ecological Urban Design Studio Workshop is to encourage students to focus on man – nature relations in order to develop better ecological awareness.

Based on the assumption that “the play” as concept and “learning by doing” as methodology together have potential to help students develop ecological awareness, over the last three years students assignment was to conceptualize, design and construct a model of the playground that in different ways establishes relations with nature. Students were supposed to propose, test and document a mini-spatial intervention that reveals and re-examines the relationship between man and nature in urban space on specific location. The task has been conducted through 4 phases: preparation, realisation, reflection and presentation.

Preparation phase includes definition of context, concept and models-segments of PLAY in relation to nature.

- Definition of CONTEXT – presentation initial elements that lead the concept of playground of each student. They identify and define focal problem and recognised spatial potential(built and natural) that influence the idea of the playing in relation to nature in their project.
- Definition of CONCEPT - a textual / visual explanation of the researched and the individual understanding and use of the idea of PLAYING in relation to NATURE that leads design of the MODELS – SEGMENTS of PLAY(ground) and SYSTEM OF PLAY.
- Design and construction of MODELS – SEGMENTS of PLAYground: Each student makes a minimum of 4 models 10 + 10cm in size 1: 100, as spatial- functional segments in which a certain form of play is envisaged. Each segment is related with at least 1 natural form with which the play is associated (trees, shaped relief, sand, grass, water ....). There may also be 10x20 segments if necessary + additional mobile elements trees, paths, people, green strokes, hills, walls, canopies ... that can be used as “binders” in forming a wider assembly.

Realization phase - A " SYSTEM OF PLAY" is formed in class by combining all available segments from a group of students. Each student experiments with segments within a defined timeframe and forms his own play system Each individual variant of PLAY SYSTEM is documented (photos, films ...) Fig.1.

Reflection phase - In the Reflection phase students reflect upon what did they learn from the workshop. They provide a graphic and textual overview of the workshop and make a link to their design projects.

Presentation phase – Final presentation of the workshop is realised through formation of A4 portfolios that contains all previous phases. It contains explanation of workshop topic, context, the idea of individual playground segments, the basics and photographs of the individual segments and the realized game systems - assemblies from the workshop, as well as the student's commentary and reflection on new findings after the workshops.

(a) (b)

Figure 1: (a) Workshop , source: Marija Cvetković (b) Models - Segments of play , source: Katarina Stojić

4.2. Results

The results of the students' works from the workshop conducted in 2018. are presented in Table 1 and Table 2. [1] They are related to the location of Ecological urban design studio - Block 70 a in New Belgrade, characterised by modernist buildings, vast and underused green spaces and presence of the Sava river. The information presented in tables is based on the content analysis of individual students design projects, artefacts and portfolios, and structured in a way to enable analysis and comparison of how nature has been revealed in each students learning path and design project.

4.3. Discussion

The results of the students work, as well as their reflections presented in portfolios, show that during each of workshop phases students were initiated to think and establish connection with nature in different ways:

- In relation to *context,* as the basis and inspiration for playground concept, students recognised different elements of existing urban nature as important to relate to: trees (S1, S3, S4, S7, S8), fields (S2), river (S1, S4), ponds (S1), hills (S2, S8, S7), skyline (S9). Besides that, they referred also to childhood as context where stronger connection between man and nature existed, recognising that it is natural to children to feel as part of nature (S4, S5, S8, S9, S10).
- Variety of playground *concepts* has been developed, and they also reflect variety of ways in which nature can be revealed and interpreted. For some students elements of nature were interpreted as potential for play (S10, S1 S2, S3, S4). For others, starting point for the concept was the idea to motivate users to be more free, active and natural in their movement and behaviour (S2, S8, S9) and to develop their natural potentials (S6) by encouraging logical thinking through free play in nature. Some approaches to playground design were more abstract in interpreting forms (S5) and relations from nature (S7) or treating nature as setting for playful art installations (S3).
- Design and modelling *segments of play* showcased variety of possibilities to reveal nature and connect it with play. Different natural elements were used (trees, ponds, hills,..) for producing playful situations and for simulation of curiosity and fun (maze). Also, some traditional play settings (swings, slides, climbers) were re-designed by use of natural elements and materials in order to produce new playing experiences and stronger connection with nature.
- Developing *play system*, by using 10x10 models – segments of play, during workshop realization phase resulted in variety of playground forms: disperse, compact, linear, area, as well as in their combinations. What is interesting is that these forms correspond to main structural elements of natural landscape (patches, corridors, matrix) as defined in landscape ecology (Forman, 1995). In this way students managed to connect "logic of play" with "logic of life" and how it is supported and reflected in landscape.

[1] Besides the authors and menthors of the workshop (Živković J., Cvetković M., Korica R.), the co-mentor of the 2018 workshop was Ivana Korica, the research assistant who demonstrated a great enthusiasm to help students complete the workshop tasks.

Table 1: Students projects form the" Make Nature visible!" workshop 1-5

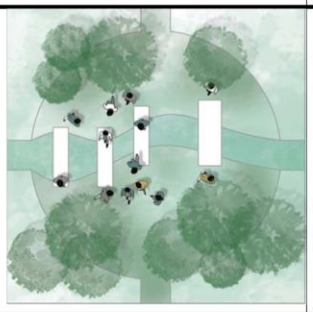
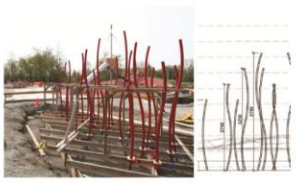
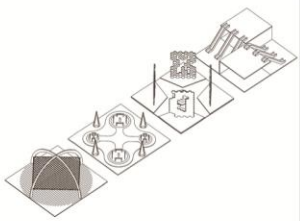
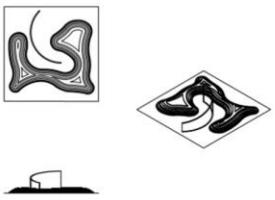
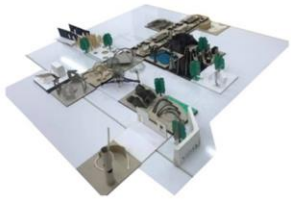
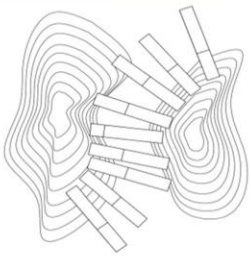
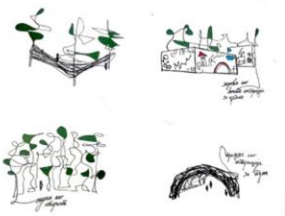
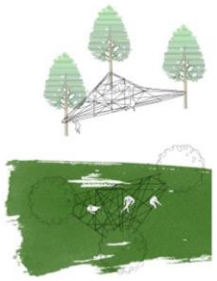
	CONTEXT	SEGMENTS OF PLAY	SYSTEM OF PLAY
Student 1 **Ana Simić** **CONCEPT** *"Overcoming an obstacle means: try, fall, try again, succeed; just like first steps, like a child's play, like a game all of us. Play in nature and with nature is divided into four topics: Bridges, Ponds, Theatre, Labyrinth"*			
Student 2 **Anja Trivić** **CONCEPT** *"The concept of the playground is based on different movements of children and modes of behaviour that may be useful to them in nature: Climbing, Hiding,Dragging between, Skipping"*			
Student 3 **Katarina Stojić** **CONCEPT** *The Idea of the playground as art installation, but also as link to childhood. Forms of play developed through: Indian tribe, Bridge, Mirror, Labyrinth*			
Student 4 **Marija Milijašević** **CONCEPT** *"As a child, I always spent time outside, in nature. I loved running, climbing trees….we all dreamed of a cottage on the tree" There are so many games to be played with, around, on the trees and with ground"*			
Student 5 **Marko Jovanović** **CONCEPT** *"Nature itself is very inspiring and diverse. The beauty of Nature is that it keeps everything in balance, harmony. Even "anomalies", have their reasons …We are part of nature and aware of it in many different ways from early childhood. "*			

Table 2: Students projects form the" Make Nature visible!" workshop 2-10

	CONTEXT	SEGMENTS OF PLAY	SYSTEM OF PLAY
Student 6 **Sara Aćimov** **CONCEPT** *Starting from the book "Last child in the woods" that promotes free play in nature, the project aims to encourage logical thinking through play and explores tactical use of different natural materials (grass, wood, sand, water…)"*			
Student 7 **Marko Jovičić** **CONCEPT** *The idea is to combine and harmonise vertical and horizontal elements of nature, through modelling the ground, and constructing barriers in order to support variety of recreational activities*			
Student 8 **Nevena Vujić** **CONCEPT** *"The idea of the playground is based on active play that develops motor skills and physical dexterity. Play in nature should activate all senses and stimulate them to move in different ways. "*			
Student 9 **Petar Đorđević** **CONCEPT** *"Today, children spend time in front of the computer, communicate and move poorly… Therefore, they should be returned to the air, wind, rain, forest, stone…. To free move and free play"*			
Student 10 **Tijana Lovrić** **CONCEPT** *"The idea for playground is based on the perception of forests as maze to play "* *Trees, trunks, branches and canopies can be transformed into tunnels, labyrinths and net structures…*			

Students' research, projects and reflections indicate that during the workshop conceptualisation and delivery, they became aware of nature and its role in designing playground in many different ways and through different paths. In general it is possible to identify four main relationships between the Nature and play as reflected in students' portfolios.

- Play *in* nature – in this conceptualisation nature is used as *setting* for play activities, and this combination produces new memorable experiences.
- Play *with* nature – this approach is related to nature perceived as *playful* by it self and with *naturalisation* of tools and devices for play
- Play *through* nature – in this approach nature is used as a lens and starting point for choice of play activities. Nature inspires and leads play as form or as activity associated with natural behaviour.
- Play *as* nature – this conceptualisation focus on the feeling that we feel as being part of nature when we play.

Also, what is worth acknowledging is that these forms of relationships between play and nature are most often present in combination in students' portfolios and design process. This means that process of revealing a nature and integrating it into design is not linear and simple and that "many roads" may lead to development of more ecologically conscious (future) architects and urban designers.

5. CONCLUSIONS

Contemporary environmental problems make it necessary to educate future architectural and planning professionals towards ecological urbanism. This challenges paradigm in urban design education to include not only professional, but also environmental/ecological knowledge, skills and awareness as educational objectives. In order to contribute to the growing body o knowledge on linking environmental and academic education towards sustainability, our research explored possibilities of using play as a tool for revealing nature as a way of integrating one of the basic ecological design principles into urban design education.

Based on Ecological urban design workshops projects, models and portfolios, we sought to understand how design of the playground can help students rethink the relation between man and nature. We analysed how nature has been revealed in different phases of the playground design process and discovered that in all design phases students managed to establish variety of relations with nature, and that nature had different roles in their projects. Their projects reflected integrative role of play in linking man and nature – but they came to that point following very different learning paths, and interpretations and use of nature. Besides that, our research point toward four main relationships between play and nature (play *in* nature, *with* nature, *through* nature and *as* nature)

From our findings we can conclude that *play* (as a concept, design task and playful workshop activity) can effectively be used as tool for educating students toward ecological urbanism by making them rethink man-nature relationships and helping them to produce places in which man and nature can flourish together. Although this research has been conducted in educational setting it would be fruitful to pursue further research on this topic in the professional setting, in order to explore the potential of play to reveal the nature in urban design in order to help building more sustainable cities.

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PROPERTIES AND QUALITIES OF DISPERSED URBAN FABRIC: UNDERSTANDING THE BANJA LUKA URBAN FORM

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ABSTRACT

Traditional configuration of the city as a dense, core-dominated unit with distinctive periphery and clear boundaries has been radically transformed during the last century. The process of urbanization fundamentally changed the cities from centric formations to the new polymorphic urban fabric deeply extended in the once rural and natural environment. Banja Luka (Bosnia and Herzegovina) is no exception to this process. Research of Banja Luka's urban form was carried by following urbanism analytical theories to conceptualizing and research the dispersed urban fabric (specifically 'The Architecture of Territory' and 'Metropolitan Landscape'). This paper is a short review of preliminary research results about the morphologies, boundaries and scales of Banja Luka urban territory. By graphic mapping of built space/open space ratio and open space typology, the research is contributing to the description and understanding of dispersed urban form and its spatial patterns of growth. The structuring role of generous open space is recognized in urban form and urban landscape formation. Moreover, the urban form research results were compared to identified intentions of the strategic planning documents about the urban form. The authors consider that comprehending the urban form as dispersed is an adequate starting point for a critical rethinking of Banja Luka's urban growth and development.

Keywords: *dispersed urban form; urbanization; open space; metropolitan landscape; Banja Luka*

1. INTRODUCTION

Robert Fishman interestingly noticed that there were a few prophets at the beginning of the 20th century who foresaw the downfall of the familiar centralized city. Those were Frank Lloyd Wright by conceptualizing his 'Broadacre city' or Louis Mumford in his classic book *The Culture of Cities*. However, no one imagined the form of the new, as Fishman put it (Fishman, 1991, p. 45). Instead, the new decentralized urban form, rapidly emerged from second half of 20th century, 'was built up by piece-meal by thousands of uncoordinated decisions made by developers, shopping mass operators, manufacturing enterprises, highway engineers and not least, the millions of Americans who have saved and sacrificed to purchase single-family homes (Fishman, 1991, p. 45).' Fishman is referring to the American city, but it is possible to generalize, and include the citizens of other parts of the world, inside of their different life opportunities.

Since no one imagined it, we needed to learn how to look at, describe and eventually understand the new city form, while it was growing in front of our eyes. Many scholars pointed out the major attributes of the 'new city'

in the last twenty years (Fishman, 1991; Soja, 2000; Burdett and Sudjic, 2008; Brenner, 2013). They mostly confirm in more details what Henry Lefebvre anticipated in his book *The Urban Revolution* (*La Révolution urbaine*) in 1970. The new spatial configurations expand into and reshape rural areas, and at the same time transform historic city cores, together forming *the new urban fabric* (*tissu urbain*) (Lefebvre, 2003[1970], p. 3). In this transformed urban landscape, the boundaries between the cities and their rural and natural surroundings are made relative. A city can hardly be seen as a spatial and functional whole, while its large-scale perimeter represents an area characterized by highly dynamic forms and sizes. In short, comparing to the traditional city, the new city is vast, dispersed, without strict functional distinctions, with elusive boundaries, and with many centralities.

'Since the new city is neither urban, nor rural, nor suburban, but possessing elements of all three, it evades the conventional terminology of the urban planner or historian (Fishman, 1991, p. 45)'. In recent years, scholars have discussed and developed the new lenses through which we should look and more importantly analyze the contemporary urban landscape in his local specificity. Beside the epistemological framework for theoretical development (Brenner & Schmid, 2015), the analytical approaches that belong to architectural/urban design way of thinking has emerged (Schmid, 2006; Topalovic, 2015; Van Der Velde & de Wit, 2009; Viganò et al., 2017). They all emphases the importance of understanding the dispersed urban form, beyond the traditional way of thinking through dense and bounded city as urban ideal we are accustomed to. That is necessary if we want to direct the urban growth in humanly proper way that we today call sustainable.

Following this thesis, the authors conducted the research about Banja Luka's contemporary urban form, shortly presented in this paper. The analytical approach called the Metropolitan Landscape was used for typological classification of urban fabric patterns and for reading their compositional arrangement, and its values and potentialities. This landscape view on dispersed urban form of Banja Luka was then compared with urban form narrative in regional and city policies. The important node of the research were open or unbuilt spaces. The research aimed at understanding the role and values of these spaces in structuring of urban form, contrary to traditional focus on built, dense or compact (Van Der Velde & de Wit, 2009; Viganò et al., 2017).

1.1. Design approaches for comprehending the dispersed urban form

Since the old city is rapidly transformed to dynamic, large and fundamentally new kind of space, the task to comprehend the urban form is not simple one. The strategies of spatial design that are developing the analytical framework for understanding the urban fabric of modern metropolis, beyond his generic description, are few (Novaković & Milaković, 2018). It takes the discipline adjustment and larger view against the classical architectural understanding of the city. The most elaborate design lenses for this large-scale view and focus shift from built and dense to open and dispersed, are coming from the advanced urbanism research hubs, specifically ETH Zurich and TU Delft.

Based on Henry Lefebvre's general theory of the production of space, ETH Studio Basel developed the simple conceptual triad for research of new urban configurations: networks, borders, and differences (Schmid, 2006). Application of these criteria in the research of different locations enables the comprehension of the specific forms of urban condition. The criterion set was first explained and applied in the ETH Studio Basel project *Switzerland: An Urban Portrait 1999 – 2003*, and it was further developed in the ETH Future Cities Laboratory project, *Territories of Extended Urbanization* in 2015 (Schmid & Topalovic, n.d.). The research of Singapore's hinterlands, as the focal location of the project, is rooted in the assumption that the relationship of the cities with the wider urbanizing territories, such as operational landscapes, natural environments and hinterlands, are central to understanding the cities and sustainability. The research puts forward the *territorial approach* to the interpretation of urbanization, in which the focus is not on the city itself, but on the urbanizing region and hinterlands (Topalovic, 2015, p. 14).

More qualitative research intentions concerning the dispersed urban form are contained in the approach developed at the TU Delft and the research program Landscape Architecture, 'guided by primary objectives of the spatial design disciplines: the understanding, definition and development of spatial quality' (Van Der Velde & de Wit, 2009, p. 55). The two approaches are not mutually exclusive. On the contrary, applied together they could offer in depth comprehension of spatiality of urbanization processes and new urban fabric. Nevertheless, the Metropolitan Landscape approach is more about the compositional problem of metropolis, and more appropriate for the research questions in context of Banja Luka. The fundamental concepts from this approach were used as a primary analytical tool for understanding the Banja Luka's dispersed urban form.

The research on landscape form of metropolis is continuation of urbanism engagement with spatial problems through landscape concept, but this time as a large-scale organizational tool. Metropolis, taken not as a synonym for the city in 20th century, but on the contrary, as 'the manifestation of a distinctively modern spatial-productive logic which opposes and unsettles it', has different spatial components and logic of their coexistence (Cunningham, 2005, p. 17). The Metropolitan Landscape approach is based on identification of fundamental patterns of metropolitan fabric ('basic forms' or 'archetypes') and the possibilities of their composing into new formations – the design of metropolis. The design will still lead to fragmented and disorienting environment if the archetypes are ordered only according to programmatic needs. The landscape is, therefore, the main methodological device that enables the composition of basic metropolis forms that 'addresses fragmentation and disorientation, but without relapsing in the hierarchy-based organization of the traditional city that has proven inadequate for the metropolitan condition (Van Der Velde & de Wit, 2009, p. 70).

Conceptualized as compositional medium, landscape is bringing three motives to metropolis design. The landscape as *a framework*, putting forward the structure of existing geomorphological system formed through ages by forces of nature and transformed by the processes of cultivation and civil engineering. The landscape as *space*, focusing the morphological relationship between the open space and built space, towards the understanding of metropolis innate and non-hierarchical relationship between artifice and nature. The landscape *as place*, or provider of meaning through 'listening and reading' the narrative of the environment. The landscape as a mean to recognize the 'points' that connects the generic network of metropolis to the genius loci (Van Der Velde & de Wit, 2009, p. 72).

The Metropolitan Landscape approach recognizes the three basic forms of the metropolis, called spatial archetypes: flowscapes, plantation and landscape theatre (Van Der Velde & de Wit, 2009). Reduced to their formal and spatial properties they exist in different scales and constitute metropolitan landscape. *The flowscapes* are linear structures in which the road is main spatial, functional and visual backbone. Infrastructural 'lines' that became the cultural phenomenon of our time and mediums of human environment experience through movement. *The plantations* are the urban surfaces under program and with diverse morphological properties. They can be large and as such developed through time with urban program as main ordering principle (dwelling, work, leisure, etc.). In addition, they can be spatially autonomous urban islands. The landscape, in this case, gains architectural expression through interaction of new program grid and existing natural and cultural framework usually seen as a substrate for design. *The landscape theatre* are urban voids, unbuilt space in inner and center distant locations of the city, where natural processes are inherent, visible and exposed to human experience.

2. RESEARCH METHODOLOGY

The research on Banja Luka's urban form is qualitative research based on data collection, analysis and interpretation as a main method. The research was structured following the two research questions: What are the major properties of Banja Luka's urban form considering basic morphological elements, such as built and unbuilt space composition in landscape? How urban form vision in planning documents is corresponding to the urban form current state of art? Following the questions, the two research tactics were applied: the map study and planning documents study. The Metropolitan Landscape normative theory influenced the choice of content in mapping and was used as a methodological interpretation device of thematic data.

The map study implies the visual representation of Banja Luka's selected territory based on data extracted from secondary literature, public documents and orthographic photography (Google Maps). Mapping and analysis were done within administrative borders of the City of Banja Luka. Decision to do research within administrative boundaries was made due to availability of cartographical material and planning documentation, recognized in advance as a research weak point. Map study was conducted in the period from 2017 until 2020, together with three generations of master students at the University of Banja Luka, Faculty of Architecture, Civil Engineering and Geodesy, within the course Urbanization in western Balkan countries.

The first and the second generation of master students were collecting and analyzing archival material and planning documentation and drawing missing maps of Banja Luka's urban form during five historical periods. Mapping the Banja Luka in different historical periods was done with the aim of identifying and understanding the modalities of urban form transformations in the longer period. The third generation of students was looking at urbanization processes in the latest 30 years. More precisely, this part of the research was done towards defining and understanding the Banja Luka's urban form today, its properties and spatial qualities. The

mapping in this step implies the graphic representation of built space/open space ratio and open space typology. In order to understand the urban form condition as it was emerging in maps, the additional maps were produced showing the coverage of the territory with planning documents, administrative division of territory, spatial connectivity (roads and railways), and protected land. Comparing the maps enabled the partial understanding of relation between the urban form condition and regulation intentions as generators of urban form. In depth reading and analysis of maps resulted in an interpretation of the relationship between built structures and underlying landscape and identification of local pattern of dispersed urban form.

In planning documents study, the two valid planning documents were analyzed for the purpose of reading and interpreting the urban form narratives. These are the Spatial plan of the Republic of Srpska (*Izmjene i dopune prostornog plana Republike Srpske do 2025. godine, 2015*) and Spatial plan of the City of Banja Luka (*Prostorni plan grada Banja Luka*, 2014). The Urban plan of the City of Banja Luka (*Urbanistički plan grada Banja Luka*) is now in the process of design. The chosen planning documents are considering the urban form in their own terms and their purpose is to direct the spatial dimension of urbanization on wider territory. Understanding the vision or prospective image of the urban fabric was the goal of the analysis. Only explicit descriptions concerning the urban form and spatial elements are extracted and interpreted, which means that potential effects of economic, social or other sector strategies on urban form were out of scope of this research. Looking for the answers to research questions, the results of map study and planning documents study were compared and discussed.

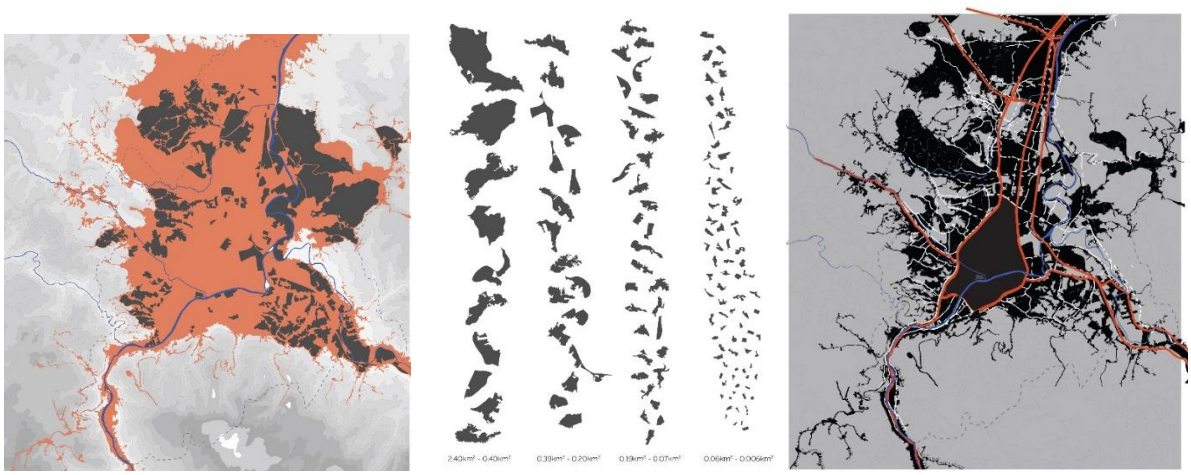
3. RESEARCH RESULTS

City of Banja Luka has closely 185 000 inhabitants according to the 2013 census, who are living in 1 238, 91 km^2 of city administrative area. The total city territory is then divided into the city core (*uže urbano područje*) and its surrounding belt (*šire urbano područje*), that together make 'the urban area' (15 % of the total city area). The rest of the city territory is called 'non-urban area' (*vanurbano područje*). Seventy five percent of the city population lives in the urban area. The change of this ratio is evident during the last fifty years or more, in favor of population number in 'urban area' compared to the number of population in 'non-urban area', with major leap happened in '90s.

3.1. Landscape view of urban form of Banja Luka

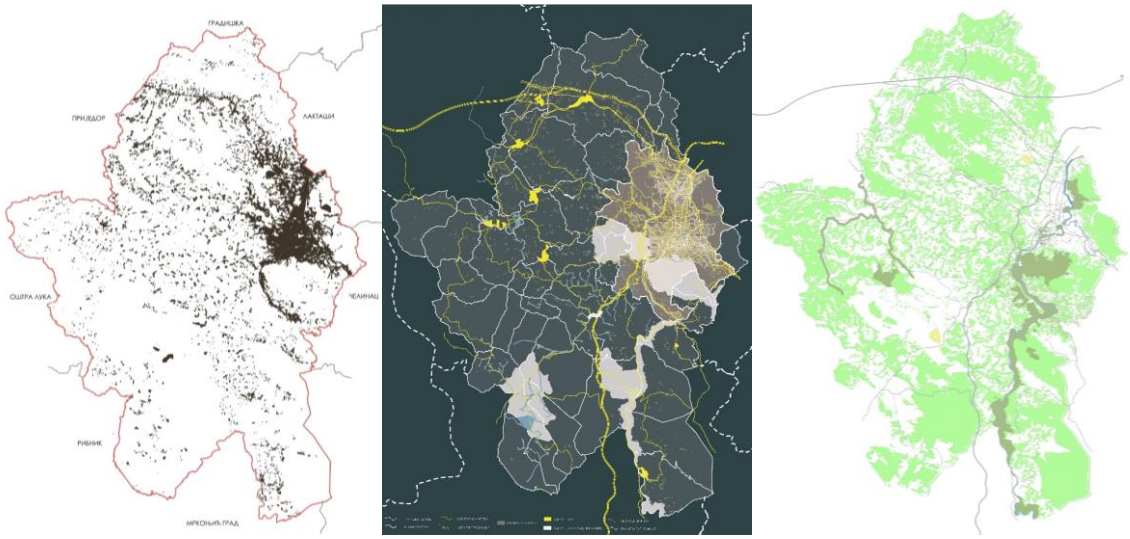
The series of maps depicting the architectonic-landscape relations in abstract spatial terms are showing dispersed properties of Banja Luka's urban form. The city core and its surrounding belt have much denser built fabric than the rest of the city territory. It is possible to identify it with the plantation archetype on a larger scale view. The thick core fabric has an irregular and porous edge, penetrated with finger like unbuilt areas along the perimeter. Many unbuilt spaces (voids) of different shapes and sizes are embedded in the form of the city 'urban area', equivalent to the theatre archetypes (Figure 1.a and 1.b). It should be noted that there is more open space than visible on the maps, since the map technique depicted plots with buildings as built area. The omitted open spaces are seen as an inherent part of plantation archetype. From the relatively dense core, the built tissue expands linearly in several directions, and from there expand linearly again in several directions in smaller size, forming the fractal like formation (Figure 1.c). Therefore, the flowscape archetype is also present in different scales. These elongated structures are following the road capillary organization. Where it is not dominantly linear, the edge of built core dispersedly expands towards the open landscape.

The metropolitan landscape composition in 'urban area' is assembled by all three archetypes. The city core as one large plantation and the belt area as dynamic collage of plantations, flowscapes and theaters of different sizes and shapes. The belt area contains the most diverse building and open space morphology, the amalgam of mega structures, small houses and vast palette of infrastructural elements. The rest of the city territory is characterized by different patterns of small-grained built fabric, evenly and finely distributed all over the green landscape of 'non-urban' area. It could be seen as a distribution of small-size plantations. However, its genealogy is different. It is created beyond the overall plan or program, house by house, road by road, and a plot by plot in long period of time. The small pieces of built space, forests, agricultural land and grasslands intertwine in a distinctive urban landscape. Ingrained in diverse geomorphology, from valleys and hills of mild contours and tame appearance to the slopes of mountain ranges.



(a) (b) (c)

Figure 1: Banja Luka's 'urban area' maps: (a) figure/ground ratio and composition in relation to geomorphology (red as a built space), (b) open space typology according to size, and c) figure/ground ratio and composition in relation to main road network (black as a built space). Maps by Isidora Gačić and Vanja Đurđević



(a) (b) (c)

Figure 2: Banja Luka's administrative territory maps: (a) figure/ground ratio and composition, (b) administrative territorial division and urban regulation plan coverage, and c) open space typology according to green structures, geomorphology and natural values. Maps by Biljana Petrović, Ivona Knežević, Jelena Rađenović and Zoran Uljarević.

3.2. Planning vision of urban form of Banja Luka

The urban form narrative in regional and city policy concerning the Banja Luka arises from two common and most important goals: comprehensive territorial development and polycentric formation of the urban fabric. These two goals are emphasized in both planning documents and are associated with the territory of the Republic of Srpska (RS) and the territory of the city.

In 'the network of urban centers' of RS, Banja Luka is the largest. It is associated with larger territory called *Banja Luka – Gradiška - Mrkonjić Grad region*, along with the other four regions that constitute the RS. All the administrative territorial units of the RS (municipalities and cities) has the urban center, so the centers together are forming the hierarchically organized urban center network, while the groups of municipalities and cities are forming the five regions. Unfortunately, this strategic regional identification of territory, which does have roots in geographical and cultural specificity, is not supported in operational level of planning. Spatial plans and urban plans have been created for administrative territories of municipalities and cities, at least some of them, while the opportunity to analyze and direct the process of urbanization on wider regional territory is overlooked. On the other hand, many municipalities do not have resources for development of strategies or plans, so in the traditional absence of elaborated construction and urban codes, vast territories between the urban centers are being transformed in 'blind filed'.

Following the same concept as in the Spatial plan of RS, the Banja Luka urban form is envisioned as a 'network of centers and settlements' in smaller scale. The 'polycentric development' concept is the spatial instrument for reaching the goal of 'comprehensive territorial development' of the city, while at the same time reaching the higher level of 'metropolization'. The advancement of international connections and the development of Banja Luka as 'international urban hub' are envisioned through 'establishment of the metropolitan functions' and reaching at least the category of 'Weak Metropolitan Growth Area'. In general, the city development is planned through simultaneous 'increase of territorial coherency' on the one side, and growth by establishing the international political and economic institutions, large companies, innovation centers, technological parks, transportation infrastructure of all kinds, cultural facilities, etc., on the other.

The polycentric territorial concept is further developed into the classification of urban centers according to the variety and number of urban functions, beside one large city center: secondary centers, village community centers, and local centers. Each basic administrative spatial unit called 'settlement' (*naseljeno mjesto*), that together comprise the entire Banja Luka territory (Figure 2.b), has one of these centers. Inside and around each of the centers there is a corresponding 'urban area' or 'rural construction area', depending on center classification. From urban form lenses, Banja Luka's urban tissue is supposed to be constituted and emerging as almost even distribution of smaller concentrations and one bigger agglomeration. Precisely there are 3 secondary centers, 2 village centers, 7 local centers and 36 very small 'other settlements', with dot like distribution on the city territory map.

The most direct tool for urban form control in the Spatial plan of the City of Banja Luka are the definition and positioning of construction land and protected land. In the case of the first, the Plan strongly recommends the new construction land inside, where possible, and around the existing built areas. Therefore, the main urban form strategy is densification and compact spreading of urban tissue. This strategy is evaluated in the Spatial plan as rational and economic concerning the utility equipment, energy efficiency and protection of land resources. In the case of the protected land, the plan defines the land with several categories of protection in which the construction is strictly forbidden (Figure 2.c: yellow and dark green). The land could be of natural values, cultural landscape values, and agricultural values or of infrastructural importance and exploitation. There are some exclusive areas with natural and cultural values, but with controlled and limited 'necessary' construction, such as touristic zones and centers.

4. DISCUSSION

The results of mapping study show the large city territory covered with small-scale grained fabric, evenly distributed in the green landscape (Figure 2.a), that not belong to the three Metropolitan Landscape archetypes according to their properties. This collage of green bits and pieces, separately covered with trees, crop plants or grass, is tailored according to heterogeneous geomorphology (Figure 2.c). It also contains the sparsely arranged built structures of different sizes, sometimes in small groups and commonly near the local roads. This spatial pattern we would like to propose as a distinctive forth archetype of dispersed urban form, at least at the level of large-scale view, and call it *the carpet.*

The forth archetype, now dominating in the 'non-urban' area of the city territory, was an inherent urban fabric pattern even of the central urban area, until last four decades of the 20th century. Several researches of Banja Luka's urban form have shown that low density was one of its key spatial characteristics during the entire period of urbanization, contrary to the western model of compact city (Simonović, 2014). Small size houses, with time complemented with larger ones, were interpolated into the landscape of grass yards, gardens, orchards, crop fields and surrounding hills' woods penetrating the Vrbas valley. Modernist architects Juraj Neidhardt, Dušan Grabrijan and Jahiel Finci have recognized this pattern as inherently present in urban development of Sarajevo and other Bosnian cities (Grabrijan & Neidhradt, 1957; Finci 1962; Finci 1967). Moreover, in the unwritten principles of the 17th, 18th and 19th century architectural culture in Bosnia and Herzegovina, they find connection and justification for modernist principles of city decentralization, separation of city functions and interpenetration of built and open green structures. Those relations are specifically concerning with the functional and compositional arrangements of neighborhoods (*mahala* and *varoš*) and local centers (*čaršija*). During the 20th century, traditional dispersed arrangement of households surrounded by gardens and orchards of Bosnian cities, including Banja Luka, was complemented with larger-scale modernist patterns of mass housing and concentrated industry, but immersed again in generous open and green spaces. The research done by Neidhardt, Grabrijan and Finci undoubtedly showed that dispersed carpet pattern of urban form is not only characteristic of Banja Luka, but of wider territorial origin. The open spaces were equally

important structural elements of these urban compositions, just as the built elements, forming together distinctive urban landscapes of Bosnian cities.

From the perspective of the regional and city policies, urban fabric of Banja Luka is supposed to develop through several strategies. The envisioned network of urban concentrations is planned to grow and expand by defining the close construction perimeter around the existing built areas. The network of urban centers and other settlements is supposed to welcome new urban services and functions as a part of Banja Luka 'metropolization' vision. The control of this urban condensation and densification strategy is supported by a selection of territories that will be covered with planning documents and that correspond to defined urban centers (Figure 1.b). In the terms of urbanization today, the question of 'other' land remains open, the majority of the city land that is not planned for construction or protection. The map study of urban form clearly shows that urbanization of Banja Luka on site is not following this plan of the urban condensation network. In the terms of Metropolitan Landscape typology, the plan is envisioning the urban form through the possible application of built areas with specific program (the plantations) and defining the linear 'directions' of development as large infrastructural projects (the flowscapes). The open spaces (the theatres) are overlooked as compositional elements of urban form and as a mean of urbanization control. In general, the urbanization narrative of Banja Luka in policies is fundamentally functional, where space is understood as an exploitative resource ('productive' and 'nonproductive land') for urban development and growth, controlled sporadically with restrictions. Architectural view on qualitative properties and values of spatial morphology is almost entirely neglected.

5. CONCLUSION

Banja Luka is now dispersed city whose borders are very difficult to define. The urban form consists of one larger, but highly porous concentration of built structures along the Vrbas river, while the majority of the territory is covered with small scale dispersed tissue embedded in heterogeneous landscape. The future research should consider this border elusiveness and look at the urbanization beyond the administrative borders as well.

The analytical theories of metropolitan dispersed urban form are offering the tools for architectural larger view of the territory and understanding the spatial component of urbanization. The landscape concept is putting forward, again, the possibilities of identifying the metropolitan compositional elements and their prospective assembling. The approaches as the Architecture of Territory and the Metropolitan Landscape are renewing the role of architectural/urban design in control of city growth. Considering the research of Banja Luka's metropolitan landscape, the narrative focus to approach could be complementary applied, offering the insight to the spatial qualities of landscape archetypes from human vision perspective.

The Spatial Plan of Banja Luka, and the long-awaited Urban Plan, should design their visions of urban growth rooted in the comprehension of dispersed urban form. More precisely, its potentials and qualities coming from the intertwining of built and open space. Otherwise, losing the sight of open spaces as structural and compositional elements will not enable the 'comprehensive development of the territory', but on the contrary could generate the segregation and marginalization. In the meanwhile, these spaces will continue to change, out of the sight of the plans that treat the city as a whole. Additionally, spatial components such as the built space and planned construction land, open space and areas in which construction is prohibited, should be viewed in the context of the compositional whole, not just through functional and exploitative paradigms that permeates plans. The humanity of space is not only obtained through the small-scale design, but on the contrary, it largely depends on the simultaneous view of the city on a larger scale.

The open spaces of different size and morphology, incorporated in the new urban landscape as his inherent structure, are of the highest value for the future of the new city. If we consider these spaces as equally important structuring elements of dispersed urban form, just as built spaces, we might hope for the fresh urban visions of the environment where the culture and nature are in the new unity. However, as Robert Fishman warns us, the dangers of the new city are more obvious that the hopes. The open spaces of inner city and hinterlands, beside their potentials and beauty, are more often seen as empty fields waiting to be filled in through the immense power of modern construction techniques. "Through greed and ignorance we could destroy the very values that inspired the new city and build instead a degenerate urban form that is too congested to be efficient, too chaotic to be beautiful, but too dispersed to possess the diversity and vitality of a great city (Fishman, 1991, p. 45)."

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GREEN LIVING ROOFS AS A PART OF GREEN INFRASTRUCTURE

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ABSTRACT

The deficiency of green spaces in urban areas is the consequence of rapid urbanization. Replacing nature with built, impervious surfaces leads to numerous environmental problems. Greening the building envelope by integrating living, organic systems into modern structures we could regain losses. In dense urban areas, roofs make up a large percentage of the impervious surfaces. Converting conventional roofs into green roofs, also designing new ones to be green, we could influence the percentage of green infrastructure in the cities, protect biodiversity and create a better quality of microclimate in urban settings. The aim of this review paper is to address the questions bearing in mind the role of green living roofs as a part of both nature and the built environment. We will present and analyze examples of green roof initiatives and policies from different countries based on environmental benefits that green roofs can achieve, such as increment of building thermal efficiency, dust and air pollution reduction, storm-water runoff reduction, interior noise levels reduction, urban heat island effect mitigation, and increment of the biodiversity. Implementation of green living roofs in Serbia will be considered as well as technical standards, guidelines and policy support concerning these systems.

Keywords: *green roof; environmental benefits; policy; green infrastructure;*

1. INTRODUCTION

Altering the surface cover of an area causes a change in the environment. The deficiency of green spaces in urban areas is the consequence of rapid urbanization. Nowadays, more than 50% of the human population is residing in cities and it will rise up to 70% in 2030, consequently, by the year 2030 average global air temperature rise of 2 °C is predicted. Pavement and buildings, as predominant surface covers in urban areas, absorb solar radiation and transmit heat back into the atmosphere. Impervious surfaces contribute to the urban heat island effect and urban stormwater runoff, as they prevent rainwater from filtering down through subsoil. Roofs make up a large percentage of the impervious surfaces in cities. In urban areas, roof area fraction may vary from 20% to 25% for less or more dense cities [1].

At the location where green space is limited green roofs make use of the natural processes and functions of vegetation to minimize the effects of impervious surfaces. Adapting the existing building envelope by integrating living, organic systems with inorganic and lifeless structures is an effective and sustainable solution for improving the environmental balance of cities. Converting conventional roofs into green roofs we could influence the percentage of green infrastructure in the cities, protect biodiversity, and create a better quality of

microclimate in urban areas. Furthermore, merging nature and built areas in their new designs architects and urban planners can limit the major negative effects of urbanization providing better living conditions at both building and urban levels.

2. GREEN ROOF OVERVIEW

The green roof accomplishes the natural balance through several layers, mimics in a few centimeters what normal soil does in a couple of meters. The terms used to define green roof thru literature are living roof, eco-roof, vegetated roof, roof terraces and rooftop garden [2] It includes roofs and structures that may be accessible, and that may be intensively or extensively vegetated.

2.1. Green Roof classification

There are two main classifications of green roofs: Extensive Green Roofs (EGR) and Intensive Green Roofs (IGR). These terms refer to the intensity of maintenance required. Each system is defined primarily by the depth of the growth media, but also by the variety and type of vegetation, varieties are shown in Figure 1.

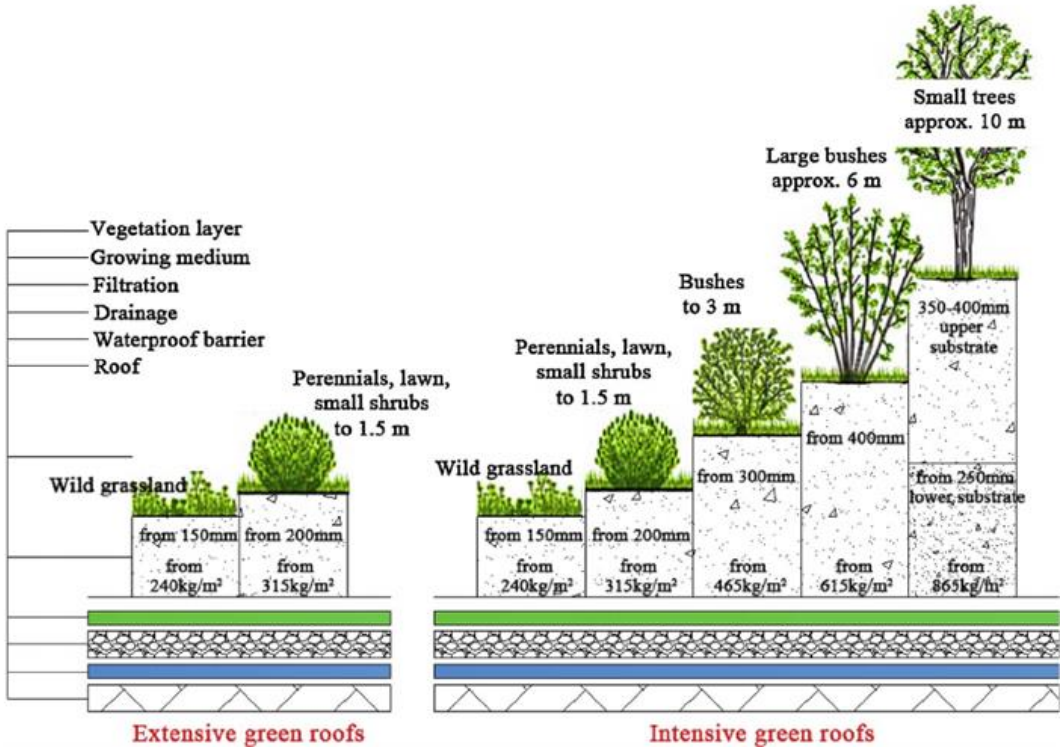

Figure 1: Green roof classification [3]

2.1.1. The Extensive Green Roofs (EGR)

Extensive Green Roofs are lightweight in structure, growth media is less than 150mm in-depth, but typically ranges from 80 to 100mm. Ideal plants are those that are tolerant to drought and temperature extremes, exhibit good growth and survival rates, demonstrate successful self-propagation, provide good ground cover density, and have a strong horizontal root system but a non-aggressive vertical root system. EGR is used mainly for environmental benefit, requires little maintenance once they are established and are generally cost-effective, particularly in commercial and public buildings with long life spans.

2.1.2. The Intensive Green Roofs (IGR)

Growth media of the Intensive Green Roofs is 200mm or more in-depth and can be well over 300mm. Because of larger growth media, these roofs require greater structural support. Furthermore, a thicker substrate allows a greater variety and size of plants such as shrubs and small trees. They are generally accessible designed to create recreational and comfort spaces. IGR has higher initial costs and requires a higher level of maintenance, including regular irrigation.

In recent literature, Semi-intensive Green Roof occurs as a hybrid system, composed of both Extensive and Intensive Green Roof characteristics. They are also known as Biodiverse Green Roofs designed to provide a

particular native vegetation type or adapted habitat for particular species of wildlife. A Biosolar Roof is another variation of a hybrid system where an extensive roof is combined with photovoltaic (PV) arrays. The green roof substrate is used as the ballast required to support the frames to which the PVs are attached, resulting in benefits to both the green roof and the PV array. The Blue Green Roofs consist of a green roof that overlies a blue roof. In their simplest form, blue roofs are designed to store rainwater, acting as a source-control feature in a sustainable drainage system. In the hybrid system, the blue component of the roof continues to act as a source-control feature but it also irrigates the green roof layer.

2.2. Benefits of the Green Roofs

Vegetation provides a broad range of environmental advantages, whether on the ground or on a rooftop. In addition to the creation of a pleasant environment, the aesthetic and visual impressions, green roofs offer several significant benefits in comparison to conventional roofs:

- Improvement of the microclimate; Shading, water retention, evaporation. Binding and filtering of dust and air pollutants. Contribute to the mitigation of the urban heat island effect
- Contribution to flood protection; Reduction in storm-water runoff and minimization of precipitation runoff peaks. Improving storm-water quality
- Noise and radiation protection; Airborne sound insulation and reduction of sound reflection. Reduction of electrical and light smog.
- Building maintenance improvement; Longer service life of the roof waterproofing membrane protecting it from mechanical damages and temperature fluctuations.
- Reduction of interventions in nature and landscape; Preservation of biodiversity and expansion of habitats for plants and animals.
- Increase in value; The property and the residential area. Additional usable space in private and public areas.
- Modern urban planning; Improvement of the work and living environment, large-scale design element for city and landscape planners.

Numerous research studies offer a complete review of the main environmental benefits that green roofs can achieve [4]. Nevertheless, in many cities worldwide, green roofs are still treated as a relatively unimportant element of the urban environment and not considered as a part of the city green infrastructure.

3. GREEN ROOF GUIDELINES AND STANDARDS

In 1975, the FLL (*Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau e.V.*; The Research Society for Landscape Development and Construction) was established by eight professional organizations in Germany [5]. They were engaged in vegetation research and using them for environmental improvement. The FLL publishes *Green Roof Guidelines - Guidelines for the Planning, Construction and Maintenance of Green Roofs*, developed from the *Principles for Green Roofing* published in 1982 and reworked several times since 1990. New topics have been added related to technical developments and where new issues have appeared. The guidelines cover design, construction and upkeep of green roofs, with detailed chapters on planting medium requirements, storm-water retention and drainage layer demands. The FLL Green Roof Guidelines are linked into the DIN and EN standards and other regulatory publications and are therefore closely bound to the given building and construction standards.

Significantly based on the German FLL Guidelines, adapted to suit the UK market, *The GRO Green Roof Code* was developed in partnership with English and European experts, including The Green Roof Centre at the University of Sheffield, Livingroofs.org, GRO (Green Roof Organisation) members, the Environment Agency and Homes and Communities Agency and Groundwork Sheffield [6]. The GRO Code is intended to be used to guide behavior relating to green roof design, specification, installation, and maintenance.

The FLL Green Roof Guidelines is the most widely accepted standard worldwide, which represents a benchmark set of regulations used as the basis for developing their own regulations and standards. However, these guidelines are developed for Northern Europe, characterized by cold and rainy days. Mediterranean area, characterized by hot and sunny days, has requirements that can't be satisfied by the green roof designed, in accordance with the German FLL standard. In Italy, the guideline is the standard for *design, execution, testing and maintenance of roof greening UNI 11235:2015*, later UNI [7]. It was published in 2007 by the Italian organization for standardization (UNI) and remodel in 2015. Its advantage is the application on a territory with heterogeneous environmental conditions. However, this standard is written in Italian and not intended to be used as an international guideline for Southern European countries.

In 2013, the Swiss Society of Engineers and Architects (SIA) issued the *Swiss roof greening norm SIA 312-SN 564312*, 2013 which substituted the *SIA 271/2, 1994 roof greening* introduced in 1994 and rework in 2007. This standard has a biodiversity approach and covers the design and construction of roof greening. After the Federal Act on the Protection of Nature and Cultural Heritage, the *Swiss roof greening norm SIA 312-SN 564312*, 2013 first answered the engineers and architects need to have nature conservation guidance for green roof design [8].

The following North American organizations were found to support guidance for green roofs: the American Section of the International Association for Testing Materials (ASTM), the National Roofing Contractors Association (NRCA), the Whole Building Design Guide (WBDG) for federal building projects, the International Building Code (IBC), and the American National Standards Institute (ANSI). Green Roofs for Healthy Cities (GRHC) and Single Ply Roofing Industry (SPRI) in cooperation with ANSI have jointly developed a Wind Design Standard and a Fire Design Standard for GLR systems. The *ANSI/SPRI VF-1 External Fire Design Standard for Vegetative Roofs* [9] provides a method for designing external fire resistance for green roofs and installation reference for roofing professionals.

FM Global Property Loss Prevention Data Sheets 1-35 – Green Roof Systems [10] is one of the international guideline documents. This datasheet provides general instructions for Green Living Roof Systems reducing the chance of property loss due to fire, weather conditions, and failure of electrical or mechanical equipment.

Green roofs can contribute during the green buildings certification process by granting additional points in different green building assessment tools such as Building Research Establishment Environment Assessment Method (BREEAM), Leadership in Energy and Environmental Design (LEED), CASBEE, BCA Green Mark, and Malaysian very own Green Building Index (GBI), etc. The LEED rating system refers to standards and guidelines for the design, construction and maintenance of green buildings was established in 1998 by the U.S. Green Building Council (USGBC) Implementing the green roof systems that covered at least 50% of the roof surface could provide additional 1 point for reducing heat island effect and 1 point for stormwater management [11]. Furthermore, a green roof can be awarded 15 LEED points in the categories of Sustainable Sites (SS), Water Efficiency (WE) and Energy and Atmosphere (EA) [12].

The UK's Building Research Establishment Environment Assessment Method (BREEAM) which was developed in 1990 recognized the green roofs as a modern concept of green building. It represents the foundation for the new green building assessment tools in Canada, Hong Kong, and Australia. Within BREEAM green roof can provide additional points in the section of Surface water run-off, Insulation and most relevant Land Use and Ecology. BREEAM ensures the most points for the green roof system, a total of 10% from overall points. This is followed by Singapore's Green Mark 9.5%, LEED 8.25 and GBI 7%. [13].

The Green Factor tool offers a numeric value for the ratio between the built area and green areas within a selected area. The aim of a Green Factor analysis is to improve the ecological sustainability of the built environment by increasing the total green area [14] while granting freedom and choice in the selection of green elements and their location within the area. Green roofs and walls are recognized as green structures. The tool allows city officials to estimate the impact of various individual green structures in relation to the sustainability goals they have set for the city, by giving each element a multiplier that feeds into the calculation of the Green Factor. The Green Factor tool appears under varying names, it has been used in Seattle, WA (Seattle Department of Construction and Inspections 2017), Berlin, Germany (Senate Department for the Environment, Transport and Climate Protection, 2017), Helsinki, Finland (City of Helsinki, 2017) and Southampton, UK (Southampton City Council, 2017).

4. GREEN ROOFS POLICIES AND INCENTIVES

In many countries, governments and municipalities began implementing public policy and incentives to encourage the construction of green roofs. The installation of green roofs is actively supported worldwide through:

- Regulations and standards that mandate or encourage green roof installations;
- Indirect financial incentives such as fee reductions and floor space density bonuses;
- Direct financial incentives such as grants and subsidies;

The following sections provide International examples of green roof policies and initiatives with different agendas. These examples could be used to provide possible guidance for policy implementation in Serbia.

4.1. Green Roof Mandates

The cities with the highest density of green roofs are located in Switzerland, Germany, and Austria. At the same time, these countries were the first to introduced mandatory policies and incentives for green roofs. Basel is one of leading green roof cities in Europe and world, which has the densest green roof areas per inhabitant, about 5.7m^2 per inhabitant. Stuttgart and Linz follow with 3.4m^2 and 2.6m^2 per inhabitant respectively [15]. In 1996, Basel implemented a law to support energy-saving measures, which was the only one of its type in Switzerland. The 5% of all energy bills from customers are put into an Energy Saving Fund, according to this law. In 2002, an amendment to the Building and Construction Law was adopted, which required that all new and renovated flat roofs must be greened considering specific design guidelines. Linz was one of the first cities in world to implement a mandatory policy for green roof construction in 1985. At present, the city has mandatory green roofs on new buildings with a roof area of over 100 m^2.

Over the past 40 years, Germany instigated green infrastructure and innovation. Around 35% of German cities have introduced green roofs as part of their regulation. The widely used construction law (The German Federal Building Code) established in 1998, set requirements for green roofs. In the late 1980s, many cities in German have integrated various green roof policies, which cause high densities of green roofs in German cities. Stuttgart, Berlin, and Munich have similar mandatory green roof policy refer to all new buildings with flat roofs larger than 100m^2 and all new roofs below 12˚ slope in Stuttgart. In addition, the Federal Nature Conservation Act, since 1993 requires compensation for the loss of valuable nature/landscape for all new buildings.

France is the only country in the world that has nationwide law (Biodiversity Act and Green Roof Statement, 2015), which requires partial integration of either green roofs or solar panels on all new commercial buildings. Regarding Scandinavia, Danish capital is the only city where green roofs are mandated. Since 2010, all the Municipalities buildings and new roofs in Copenhagen with below 30˚ slope must be covered with a green roof, according to Green Roof Policy. Today green roofs are integrated into the Wastewater Plan, Climate Plan, and Climate Adaptation Plan as well in the Strategy for Biodiversity. Even with these mandatory policies, the current density of green roofs per inhabitant is relatively low about 0.07m^2 per inhabitant. The Antwerp recognized green roof as a good solution to sea-level rise, floods risk, and urban heat island problems and in 2011 made mandatory storm-water management plans for new buildings and buildings that are being renovated in case it is possible.

Toronto in Canada was the first local government in North America to adopt mandatory polices in terms of green roof construction (Green Roof Bylaw, 2009). All new residential, commercial and industrial buildings with a floor area greater than 2000m^2 must include a green roof covering between 20 and 60% of roof area, according to legislation. Instead of constructing the required green roof the developers can seek approval to pay 200$/m^2. Collected funds are directed to the Eco-Roof Incentive Program.

In USA, San Francisco became the first city that makes mandatory incorporation of green roof, in 2017. As stated in Better Roof Ordinance between 15 to 30% of roof area on most new buildings must be covered with green roof and/or solar panels. Until 2015, Washington DC was the leading city in North American, which had the highest density of green roofs per inhabitant, as a result of its River Smart Rooftops Program.

The problem with urban heat island effect forced the Tokyo Metropolitan Government (TMG) to respond to adopting the policies requiring green roofs on buildings (Green Roof Law, 2001). The TMG has mandated green roofs on a percentage of the area of every new building, over 20% of the total site must be set as the green roof in cases where the facility is over 1000m^2 for private developments and 250m^2 for public developments [16]. Failure to provide green roofs results in a penalty for developers in 200000 yen. In the first year after the passage of the law, the total net area of green roofs almost doubled from 52400 m2 in 2000 to over 104400 m2 by the end of 2001.

4.2. Green Roof Incentives

The incentives policies such as financial substitute or various fees reduction to enforce the installation of green roofs appear to be growing worldwide. At least 48 German cities offer financial incentives to increase the area of green roofs. For example, Munster, Munich, Düsseldorf, and Cologne offer a reduction in storm-water fees for green roofs. The Green vs. Gray Program in Muster greened roughly 1000m^2 of rooftop each year granted 25000€. If a storm-water runoff is directed into ponds, rivers, creeks, or seeps into the ground, no storm-water fee is levied. If a green roof is installed, the storm-water fee is reduced by 80% to 0.09/m^2 of green roof annually. By 2002, approximately 12000 m^2 of green roofs had been planted through the incentive program before it ended due to financial limitations [17]. Since 1986, Stuttgart has a financial support program

for green roofs and walls, which covers 50% of installation costs up to a maximum of 10000€. Hamburg and Frankfurt adopted similar incentive programs in 2018. By 2008, Rotterdam in the Netherlands had also begun to apply incentives for storm-water management to increase the number of green roofs to 600000 m^2 by 2025. Besides mandatory polices Linz implement financial incentives in 1989. The policy reimbursed rebates up to 30% of the cost of installing a green roof. Vienna has financial incentives of 8-25€ per m^2, since 2003. The maximum subsidy can be 2200€. Until 2010, the 150000€ has been invested in the conversion of 16000m^2 of roofs [18]. Furthermore, Vienna provides financial support for the maintenance costs for green roofs in the amount of approximately 0.19€·m^2.

In 2017, the Czech Republic adopted a National Green Savings Program under which green roofs are eligible for support. Currently, four cities in the Czech Republic have policies to encourage green roofs. For example, in 2019, Brno has invested 780000€ in funding for green roofs. The program was the first of its kind in the country. Based on the incentive adopted in Wroclaw, Poland in 2015, the usable areas of residential premises in buildings, on which green roofs were constructed, were exempt from tax, while the resolution was effective. The amount of tax allowance depends on the number of floors in the building, on which the green roof was constructed and the surface area of the green roof. The city of Malmö was the first to widely implemented green roofs in Scandinavia, and support urban greening by encouraging the use of a landscape planning tool (the Green Space Factor). Stockholm also requires the use of Green Space Factor for all property developers building on city land.

Financial incentives for green roofs are widely present in many cities in North America. Natural Resources Canada gives financial incentives for commercial and institutional buildings with green roofs that improve the buildings energy efficiency. Through the Eco-Roof Incentive Program, Toronto encourages the installation of green roofs on existing and some new buildings by offering 100$/$m^2$ for green roof projects. In addition, Structural Assessment Grant gives up to 1000$ to assess whether the existing building is suitable for green roof construction. This self-sustaining program draws funding from cash-in-lieu payments through the Green Roof Bylaw. Vancouver also gives exempt from developer permit fees for buildings with green roofs (Plant Connection Inc., 2016). Municipals across the US encourage the installation of green roofs with tax credits and rebates. The Chicago Department of Planning and Development has been actively encouraging the installation of green roofs since early 2003. The Green Permit Program launched in 2005 consists of a faster building license through which developers can save both time and money. If at least 50% of the roof surface area or a minimum of 185.8 m^2 is covered with vegetation, the City of Chicago grants a density bonus, which permits an increased number of units allowed on a piece of property.

In Singapore, rooftop greenery is promoted by not including certain portions of the areas used for greenery in the calculation of a building gross floor area. These policies are part of a regulatory framework implemented by the Urban Redevelopment Authority. To increase greenery provision in Singapore, the National Parks Board introduced the Skyrise Greenery Incentive Scheme (SGIS) in 2009, where NPB will fund up to 50% of installation costs of rooftop greenery and vertical greenery. The incentive scheme was effective from 1 April 2015 and until 31 March 2020.

4.3. Green Roofs of Serbia

Green infrastructure is of high importance in terms of its role in climate change adaptation and mitigation. In Serbia green infrastructure still has no firm support in legislation, although The Law on Planning and Construction provides a minimal framework for its planning. It is up to local authorities to prescribe requirements and ways of compensation for destroying green space. This provides the possibility for municipalities to take initiatives such as the Decision of the City of Belgrade for green roofs from 2011, which was the first step forward in terms of the initiative of local authorities. Unfortunately, this Decision is questionable and has not been implemented yet. Another step was made in 2015, the city of Belgrade adopted the Action Plan for Climate Change Adaptation (hereinafter APCCA), emphasizing the planning and implementation of green infrastructure networks throughout the metropolitan territory as a measure of the highest priority [19]. Nevertheless, according to the current legal framework, types of green spaces such as green roofs, as well as green walls and green parking lots, are not included in the total amount of greenery. There are problems regarding the implementation of the concept of green infrastructure and no adequate methods exist for measuring the achieved results, neither an adequate database of contemporary green urban spaces.

In 2018, the National Green Roof Association was founded in Novi Sad with the aim of gathering the professional and public expertise and proactively influence the awareness and the need for green construction

in every segment of the construction industry. Together with the Faculty of Technical sciences, they are currently working on draft document Green Factor for Novi Sad trying to address the issue of an extremely low percentage of green areas in the city, which was below 5%. National Green Roof Association proposed communal tax exemption for the accessible green roof in (tax is 100€/m^2 of the roof area in the city zone and 50€/m^2 of roof area outside of the city zone). This incentive for green roofs in Novi Sad is still in the procedure by the local authorities.

Standards and practices from other countries could provide a basis for the development of Serbian Green Roof standards. Currently, the lack of information represents an obstacle for most investors and property owners for green roof implementation. From the examples above we found that raising public awareness of green roofs has a significant role in implementing a green roof policy. At the same time, Serbia needs to conduct locally oriented research relate to green roof benefits in our climate. There is a knowledge already accumulated by decades of experience worldwide and Serbia could gain from applying data in starting a national green roof initiative.

5. CONCLUSION

European jurisdictions have long used green roof technology to reduce energy use in buildings, for stormwater management, and biodiversity conservation. Linking the policy to a financial gain, like in the form of reduced stormwater fees, can make acceptance of the policy easier. Understanding the motivating influences behind the extensive application of green roofs is the key to developing programs supporting technology. It is necessary to increase public awareness of green spaces and enforces promotion activities in terms of urban green space in any green roof initiative. The government may play a substantial role in encouraging green infrastructure implementation and give a positive example throughout the installation of green spaces in public buildings, which already facilitate public access. Many governmental buildings have flat conventional roofs or lower slope multilevel ones. These types are ideally suited for applying Green Living Roof systems. Initial support from high profile individual or pilot project retrofitting the governmental building could provide a good start. If we recognize green roofs, as one of the green infrastructure solutions, we would be able to accomplish a beneficial influence on the urban environment. Besides environmental benefits, investing in green roofs as a part of the green infrastructure we would provide many social benefits and create jobs.

ACKNOWLEDGEMENTS

This paper is part of the work within the National Program of Energy Efficiency, project number III42008, funded by the Government of the Republic of Serbia.

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SOLAR PARKING CANOPY AS A PART OF ENERGY EFFICIENT URBAN PLANNING

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ABSTRACT

A portion of both urban and suburban environments are devoted to parking lots. The number of spaces per vehicle is rising as the adult population has become more dependent on cars. Parking lots are large pavement surfaces with the sole purpose of car storage. For public buildings parking area, often larger than the building footprint it serves, is empty while the building is not occupied and space itself can't be repurposed. Asphalt and concrete absorb the sun's energy and retain heat thus contributing to the urban heat island effect. Installing a solar canopy over an existing parking lot is a more efficient use of the same square footage, it could turn an open pavement surface into a significant electricity generator. Using a solar canopy, the production of green energy could be realized decreasing the UHI, hence reduction in the greenhouse emissions could be provided while adding aesthetic and accomplishing economic benefits. The shade of the canopy could also improve the fuel economy of cars that park underneath. In this research paper, we will consider the Electrical Engineering High School Nikola Tesla Niš parking lot for solar parking canopy installation and possible benefits it could offer.

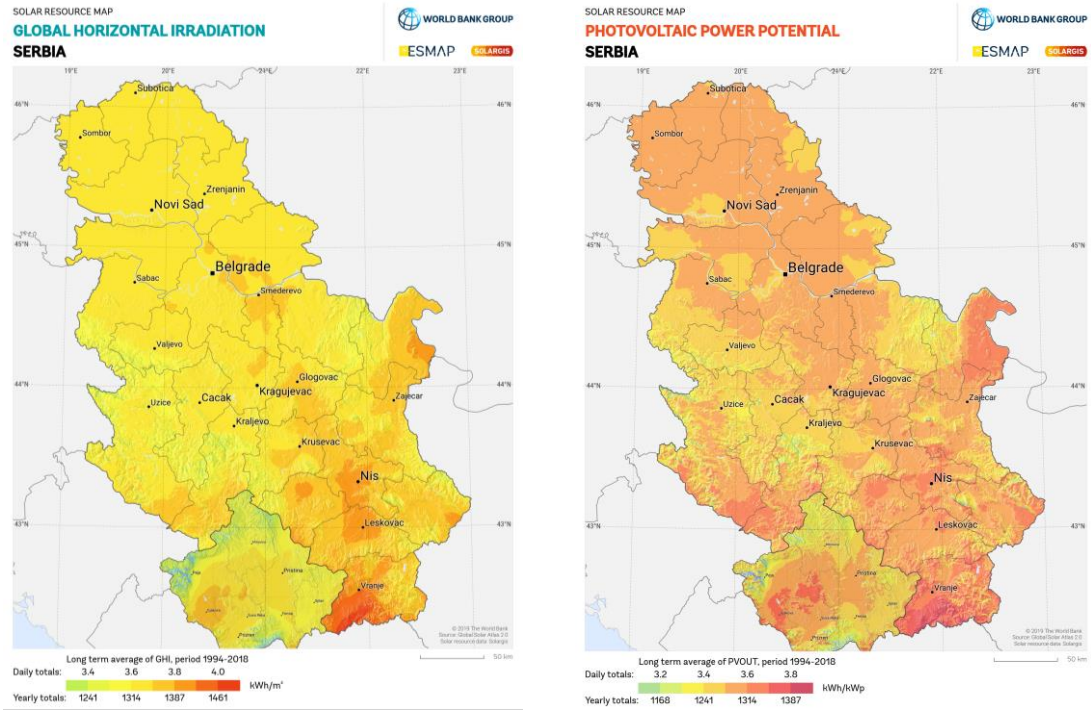
Keywords: *solar; energy; parking; canopy; urban planning;*

1. INTRODUCTION

Population growth projections indicate that by 2050 over 70% of the global population will live and work in cities since urban development will continue its progression in the upcoming decades [1]. The continuous temperature increase in the urban areas, affected by the rapid urbanization and undeniable climatic change, is escalating the energy problem of cities and intensifying the pollution problems. The main impact of cities on the local weather is the Urban Heat Island (UHI). Parking lots are large pavement surfaces that absorb the sun's energy and retain heat thus contributing to the urban heat island effect. The number of spaces per vehicle is rising, as the adult population has become more dependent on cars, thus the large portion of the urban environment is dedicated to parking lots. Installing a solar canopy over an existing parking lot is a more efficient use of the same square footage and could turn an open pavement surface into a significant electricity

generator. Solar energy, as renewable energy, is seen as a necessary step toward sustainable energy development, reduction of fossil fuel usage and mitigation of climate change.

Solar radiation energy reaches the surface of the Earth and the potentially usable solar radiation amounts to about 190 million terawatt-hours annually. This energy is about 170 times greater than the total reserves of coal worldwide and, when compared to the energy needs of mankind, which amount to 130 thousand terawatt-hours annually [2] Serbia has the average of about 272 sunny days and about 2300 sunny hours. The average daily energy of global radiation, for flat surfaces, in the territory of the Republic of Serbia ranges from 1,1 kWh/m^2 in the north to 1,7 kWh/m^2 in the south during the winter period, while for the summer period it ranges from 5.9 kWh/m^2 in the north to 6.6 kWh/m^2 in the south. Annually, the average value of the overall sun radiation for the territory of the Republic of Serbia ranges from 1200 kWh/m^2 in northwest Serbia to 1550 kWh/m^2 in southeast Serbia, while in the middle part it is about 1400 kWh/m^2.



(a) (b)

Figure 1: (a) Serbia Global Horizontal Irradiation, and (b) Serbia Photovoltaic Electricity Potential

The average solar radiation in Serbia is about 40% higher than the European average, nevertheless, the utilization of solar energy is nowhere near the practice in countries of the European Union.

2. BENEFITS

Renewable energy is seen as the solution for managing both increasing electricity demand and environmental sustainability. Solar canopies are an innovative way to maximize an existing space for multiple purposes and benefits. Photovoltaics are seen to be generally of benign environmental impact, generating no noise or chemical pollutants during use. It is one of the most viable renewable energy technologies for use in an urban environment, replacing existing building cladding materials [3]. By installing the PV parking canopy, the University of Utah predicted production of electricity with close to zero emissions [4], meaning no CO_2, NH_4, or N_2O produced. In their research, the most significant effect of PV parking spots was the reduction in carbon dioxide (CO_2) emitted by the University. For each covered parking space, it was estimated the University would save 2.5 metric tons of CO_2 emissions per year. Along with the CO_2 emission reductions in methane (NH_4) and nitrous oxide (N_2O) of 0.1 metric tons and 0.03 metric tons would also occur, chemicals known to cause acid rain and to increase global warming.

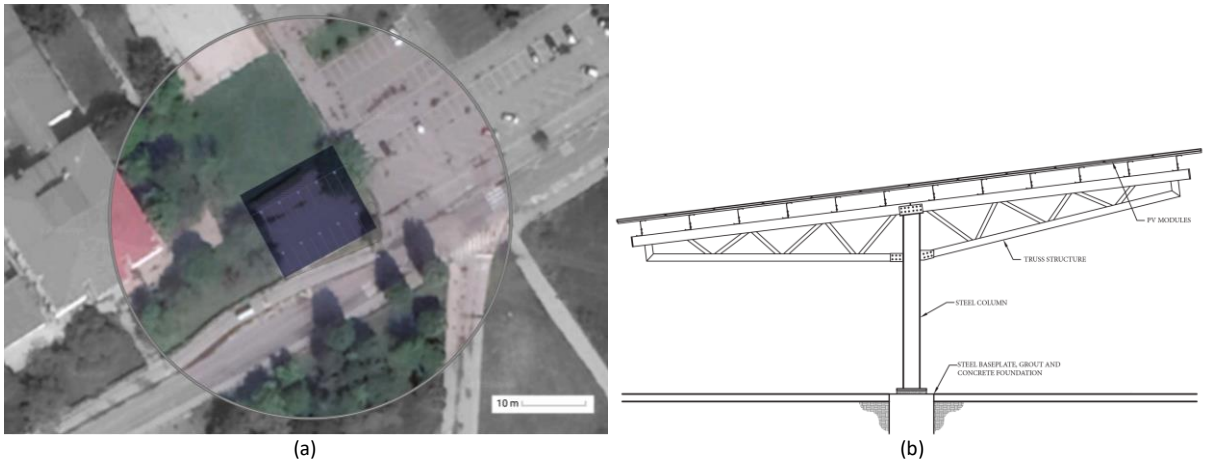
Furthermore, Urban Heat Islands, which can lead to greenhouse gas emissions and increased summer peak energy demands, could be mitigated by installing solar parking canopies. Solar panels absorb solar energy to produce energy used in buildings. During this process, they modify the energy balance of the urban surface in contact with the atmosphere and thus influence the urban micro-climate. A scenario of large but realistic deployment of solar panels on the Paris metropolitan area was simulated in the research [5] and the results

showed a reduction in the Urban Heat Island (UHI) of 0.2 K by day and up to 0.3 K at night. Also, it was calculated, in the same study, that for the summer period the solar panels reduced the energy needed for air-conditioning by 12%. Since the Urban Heat Island effect is most pronounced during summer peak power demands the use of PV panels to mitigate is beneficial for the amount of power produced by the PV panels.

One of the obvious benefits considering the solar parking canopy is the shade provided by the solar panels covering the vehicles. Shade considerably reduces the vehicle temperature during the day, protecting it from sun damage, such as paintwork damaged or cracked and warped interiors during the hot summer period. In a typical parking lot, a car is subjected to direct sunlight exposure in the spring and summer months. If the temperature reaches 27°C or more, the temperature inside a vehicle can quickly climb between 37°C to 54°C degrees according to the Centers for Disease Control and Prevention. The research [6] shows that at 35°C, the energy consumption would increase ranges from 2% to 70% and that these increases were due to the extra energy required to run the air-conditioning system to maintain 22°C cabin temperatures. These increases in energy consumption depended on the air-conditioning system type, powertrain architecture, powertrain capabilities and drive patterns. The more efficient the powertrain, the larger the impact of climate control (heating or cooling) on energy consumption. Additionally, lower internal temperature provides more comfort for drivers entering the car after sun exposure and reduces their heatstroke risk. As the survey shows [7] shade is perceived by drivers as a valuable parking lot asset. Furthermore, the solar parking canopy could protect from both rain and snow.

3. METHODOLOGY AND RESULTS

In this research, we will consider the Electrical Engineering High School Nikola Tesla Niš parking lot for solar parking canopy installation (Figure 2a). Niš is situated in the Southern and Eastern Serbia region at the 43°19' latitude north and 21°54' longitude east, in the Nišava valley.



(a) (b)

Figure 2: (a) Location of High School Nikola Tesla Niš parking lot and proposed solar canopy, and (b) Potential truss canopy construction

There are no visible markings for parking places and the concrete suffered mechanical damage over time. Groundwork, reconstruction of the car access is suggested and the formation of 20 parking spaces. The 90' parking angle would provide the most parking spaces for a given area, two rows with 10 parking spaces each, divided by two-way traffic flow. In the north part of the lot, the pedestrian zone is designed making the straight line to the High School entrance plane. A truss canopy is proposed for a solar mounting canopy structure. Two, five columns, solar canopies are designed with a length of 24m and a width of 9m for ten cars in a row. The total of 432 m^2 space is at the solar canopy shade.

3.1. Case studies configuration

Array/system configuration and preliminary simulations were done in PVsyst [8] software. Three cases C1, C2, and C3 were considered, with a unit nominal power of 220Wp, 340Wp and 540Wp respectively (Table 1.).

Table 1: PV Array Characteristics for case studies C1, C2 and C3

PV module	*C1*	*C2*	*C3*
Model	*TP648M-220*	*TD6E72M-340-L*	*LR5-72 HIBD 540 M*
Manufacturer	*Talesun Solar*	*Talesun Solar*	*Longi Solar*
Unit Nom. Power	*220 Wp*	*340 Wp*	*540 Wp*

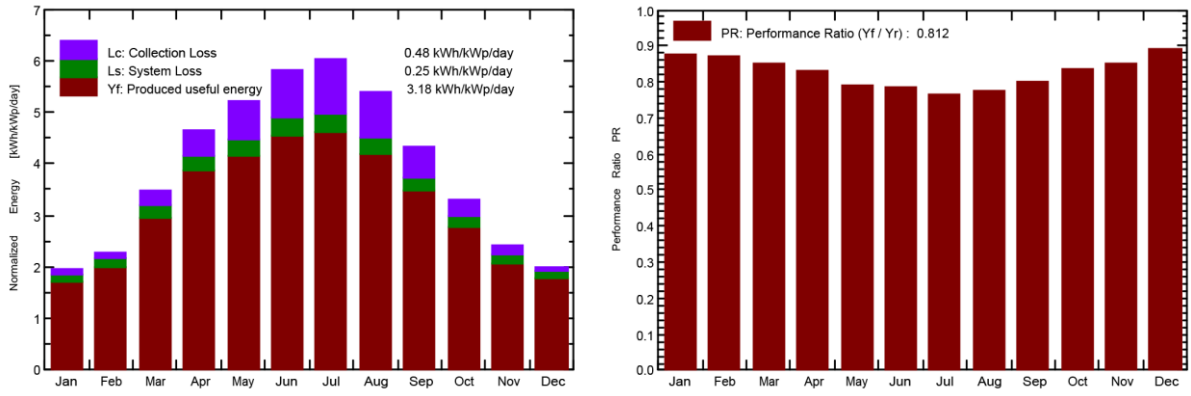
nb. modules	*322*	*210*	*169*
Nominal (STC)	*70.8 kWp*	*71.4 kWp*	*91.3 kWp*
Module area	*422 m²*	*422 m²*	*432 m²*

The total nominal solar power for every case study was calculated for available space on a canopy at a 1° azimuth angle facing south and a 30° slope angle according to geographical location. The monthly and annual solar energy generation for C1, C2, and C3 is given in Table 2 (EArray – Effective energy at the output of the array; E_Grid – Energy injected into the grid; PR – Performance Ratio). In these simulations, nearby building and tree shading effects are ignored to know the maximum nominal solar energy generation.

Table 2: Simulation main results for case studies C1, C2, and C3 at the given location

	Global hor. irradiation [kWh/m²]	*C1*			*C2*			*C3*		
		EArray [MWh]	*E_Grid [MWh]*	*PR [ratio]*	*EArray [MWh]*	*E_Grid [MWh]*	*PR [ratio]*	*EArray [MWh]*	*E_Grid [MWh]*	*PR [ratio]*
January	*38.5*	*4.09*	*3.75*	*0.877*	*4.12*	*4.00*	*0.929*	*5.31*	*4.85*	*0.878*
February	*49.0*	*4.29*	*3.95*	*0.870*	*4.32*	*4.21*	*0.920*	*5.57*	*5.10*	*0.870*
March	*89.2*	*7.02*	*6.50*	*0.851*	*7.11*	*6.93*	*0.901*	*9.16*	*8.46*	*0.859*
April	*128.6*	*8.86*	*8.22*	*0.830*	*9.02*	*8.80*	*0.881*	*11.62*	*10.77*	*0.844*
May	*162.5*	*9.80*	*9.09*	*0.792*	*10.05*	*9.80*	*0.847*	*12.98*	*12.02*	*0.814*
June	*180.4*	*10.42*	*9.67*	*0.785*	*10.70*	*10.44*	*0.841*	*13.83*	*12.81*	*0.808*
July	*189.8*	*10.90*	*10.12*	*0.765*	*11.25*	*10.98*	*0.823*	*14.56*	*13.51*	*0.794*
August	*158.7*	*9.88*	*9.18*	*0.775*	*10.18*	*9.94*	*0.833*	*13.18*	*12.23*	*0.802*
September	*112.5*	*7.94*	*7.37*	*0.800*	*8.13*	*7.93*	*0.854*	*10.52*	*9.74*	*0.820*
October	*78.4*	*6.56*	*6.08*	*0.838*	*6.67*	*6.51*	*0.890*	*8.61*	*7.96*	*0.850*
November	*47.3*	*4.75*	*4.38*	*0.852*	*4.81*	*4.69*	*0.905*	*6.21*	*5.71*	*0.860*
December	*38.0*	*4.24*	*3.91*	*0.892*	*4.27*	*4.15*	*0.941*	*5.50*	*5.05*	*0.892*
Year	*1273.1*	*88.74*	*82.21*	*0.812*	*90.64*	*88.38*	*0.866*	*117.05*	*108.20*	*0.830*

3.1.1. Simulation results C1



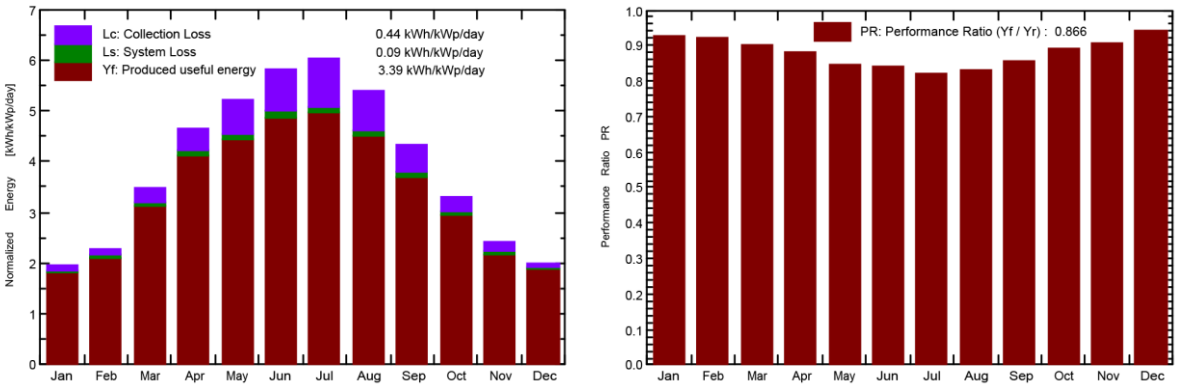
(a) (b)

Figure 3: (a) Normalized productions (per installed kWp C1): Nominal power 70.8 kWp, and (b) Performance Ratio C1

Simulation done in PVsyst software showed that the total nominal 70.8kWp solar power is available at a calculated space by using 322 photovoltaic modules with a unit nominal power of 220Wp at the proposed location in Niš. The available produced energy is 82.21MWh/year with specific production of 1160kWh/kWp/year and a performance ratio of 81.21% (Figure 3).

3.1.2. Simulation results C2

Total nominal 71.4kWp solar power is available at a calculated space by using 210 photovoltaic modules with a unit nominal power of 340Wp at the proposed location. The available produced energy is 88.38MWh/year with specific production of 1238kWh/kWp/year and a performance ratio of 86.63%. This can be seen in Figure 4 below.

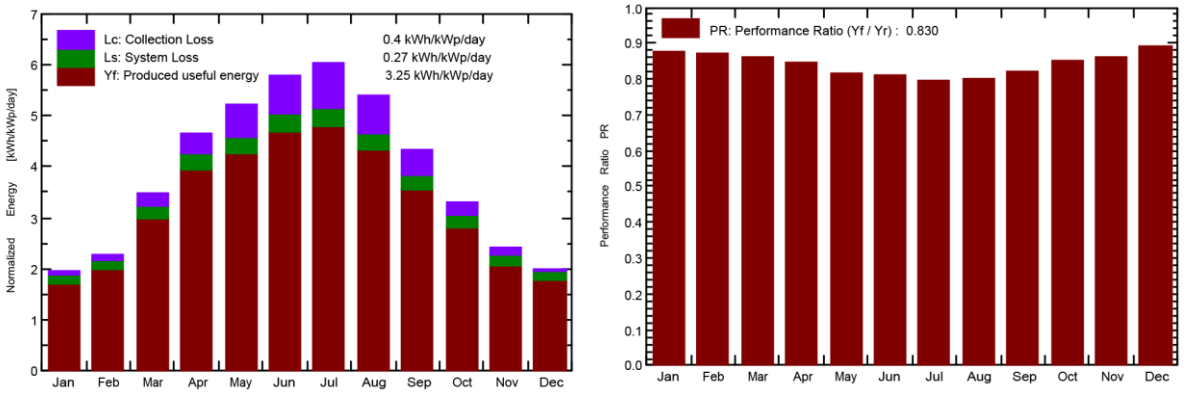


(a) (b)

Figure 4: (a) Normalized productions (per installed kWp C2): Nominal power 71.4kWp, and (b) Performance Ratio PR C2

3.1.3. Simulation results C3

Using 169 photovoltaic modules with a unit nominal power of 540Wp calculations showed total nominal 91.3kWp solar power available at the proposed location. This will result in available produced energy of 108.2MWh/year with specific production of 1186kWh/kWp/year and a performance ratio of 82.96%. This can be seen in Figure 5 below.



(a) (b)

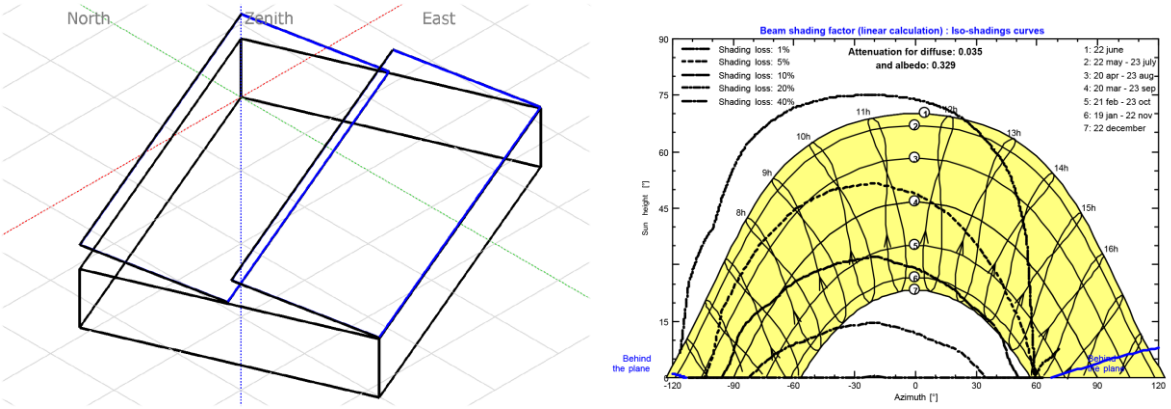
Figure 5: (a) Normalized productions (per installed kWp C3): Nominal power 91.3kWp, and (b) Performance Ratio PR C3

3.2. Canopy analysis and system loses

Performed simulations were done searching for the maximum nominal solar energy generation for the given location, furthermore to be able to compare differences in results from C1 to C3. We took favorable case C3 and considered canopy characteristics, nearby building and tree shading effects. Two, five columns, solar canopies were proposed with a length of 24m and a width of 9m for ten cars in a row. The truss canopy has a single surface slope, with the tilt angle 10°of the rooftop. The total nominal solar power was calculated for 432m2 of available space on a canopy at a -23° azimuth angle facing south and a 10° slope angle according to truss canopy characteristics (Figure 5). The monthly and annual solar energy generation for C4 (modified C3) is given in Table 3.

Table 3: Simulation main results for case study C4 (E_User – Energy supplied to the user; E_Solar – Energy from the sun; E_Grid – Energy injected into the grid; EFrGrid -Energy from the grid)

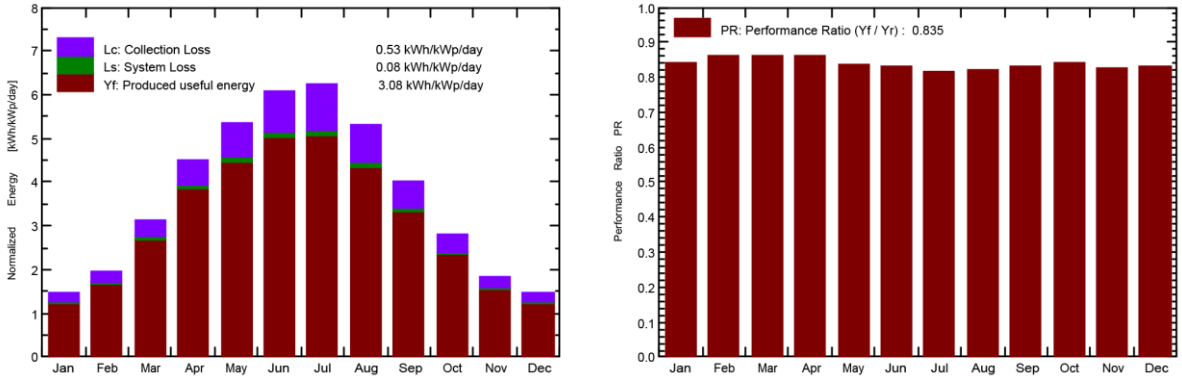
	Global hor. irradiation [kWh/m²]	*C4*				
		EArray [MWh]	*E_User [MWh]*	*E_Solar [MWh]*	*E_Grid [MWh]*	*EFrGrid [ratio]*
January	*38.5*	*3.63*	*13.30*	*2.496*	*1.02*	*10.80*
February	*49.0*	*4.40*	*8.50*	*2.475*	*1.80*	*6.03*
March	*89.2*	*7.83*	*9.13*	*3.397*	*4.23*	*5.73*
April	*128.6*	*10.83*	*4.25*	*2.027*	*8.54*	*2.22*
May	*162.5*	*12.96*	*3.92*	*2.057*	*10.59*	*1.86*
June	*180.4*	*14.15*	*5.47*	*2.999*	*10.82*	*2.47*
July	*189.8*	*14.71*	*4.90*	*2.657*	*11.71*	*2.24*
August	*158.7*	*12.63*	*5.78*	*2.843*	*9.49*	*2.94*
September	*112.5*	*9.35*	*11.80*	*4.475*	*4.64*	*7.33*
October	*78.4*	*6.85*	*13.90*	*4.300*	*2.38*	*9.60*
November	*47.3*	*4.32*	*14.00*	*3.100*	*1.10*	*10.90*
December	*38.0*	*3.62*	*14.80*	*2.866*	*0.64*	*11.93*
Year	*1273.1*	*105.28*	*109.75*	*35.691*	*66.97*	*74.06*



(a) (b)

Figure 6: (a) Perspective of the PV-field and surrounding shading scene, and (b) Iso-shadings diagram

Still using 169 photovoltaic modules with a unit nominal power of 540Wp, but with canopy at a -23° azimuth angle facing south and a 10° slope angle, calculations showed available produced energy of 102.7MWh/year with specific production of 1125kWh/kWp/year and performance ratio of 83.54%. This can be seen in Figure 6 below.



(a) (b)

Figure 7: (a) Normalized productions (per installed kWp C4): Nominal power 91.3kWp, and (b) Performance Ratio PR C4

By identifying the main sources of losses, we created in PVsyst the loss diagram (Figure 7) to provide a quick and insightful look into the quality of a PV system design. The array losses start from the rough evaluation of the nominal energy, using the global effective irradiance and the array MPP nominal efficiency at STC. Then it gives the detail of the PV model behaviour according to the environmental variables. Each loss is defined as a percentage of the previous energy quantity.

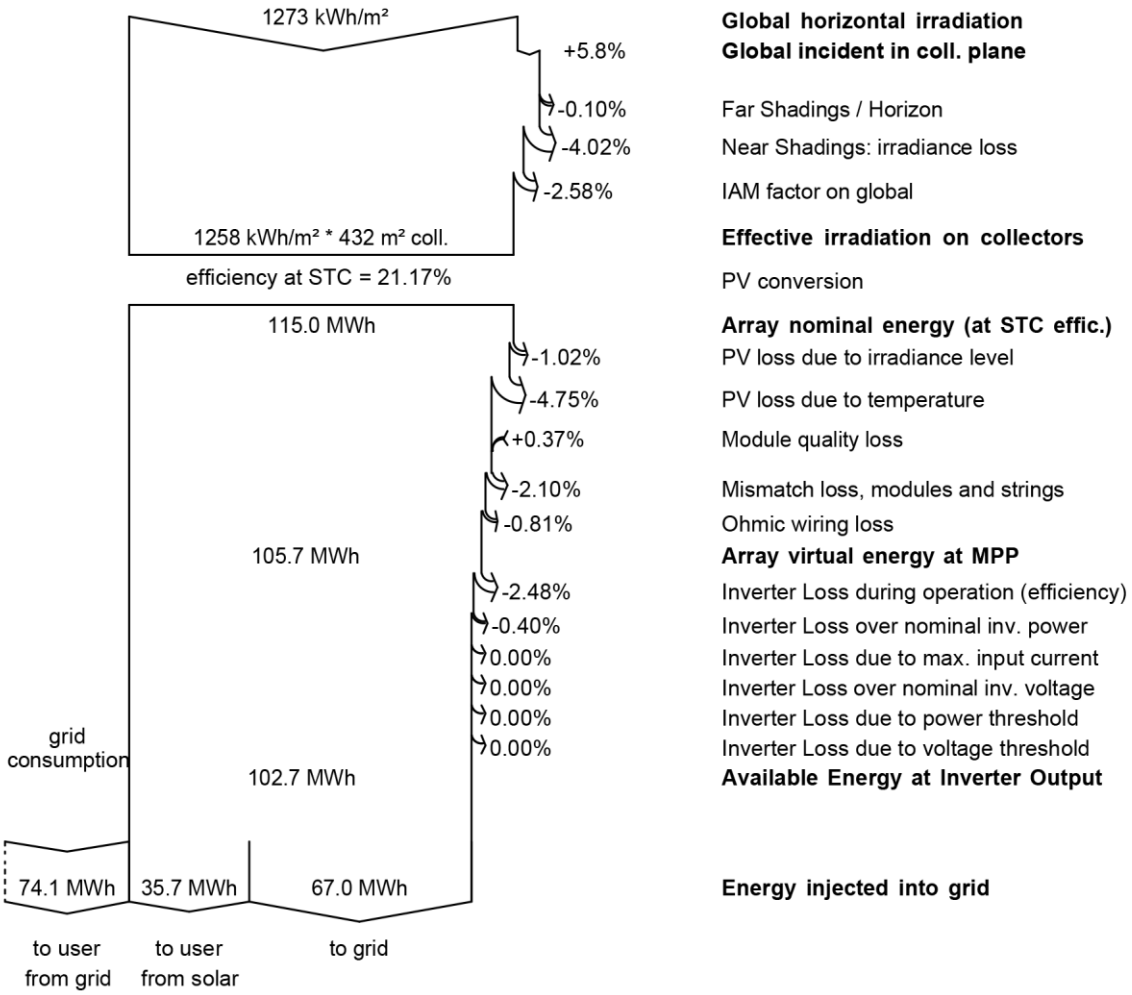


Figure 8: Loss diagram over the whole year for C4

Considering Electrical Engineering High School Nikola Tesla Niš parking lot for solar parking canopy installation bearing in mind canopy characteristics, a nearby building, and tree shading effects we calculated losses over the whole year for C4. The results showed 74.1 MWh/year of the energy would be drawn from the grid for the internal consumption when PV is not sufficient, 35.7 MWh/year of the energy needs would be consumed by the user obtained from solar and 67.0 MWh/year of the excess energy would be injected into the grid obtained from solar as well.

4. CONCLUSION

In this research paper, we considered the Electrical Engineering High School Nikola Tesla Niš parking lot for solar parking canopy installation. A solar parking canopy could be built above pre-existing parking spaces, making it an innovative product that can turn a typical, non-productive parking lot into a cost-effective solar power plant. Using a solar canopy, the production of green energy could be realized and reduction in greenhouse emissions could be provided while adding aesthetic and accomplishing economic benefits. Over the whole year calculations showed that 74.1 MWh of the energy would be drawn from the grid for the internal consumption when PV is not sufficient, 35.7 MWh of the energy needs would be consumed by the user obtained from solar and 67.0 MWh of the excess energy would be injected into the grid obtained from solar as well. Furthermore, the installation of PV panels on the parking canopy would help to reduce the heat island effect by covering the parking lots, thus heat would be absorbed by the PV panels to create energy for Electrical Engineering High School Nikola Tesla Niš instead of being absorbed by the pavement to create higher temperatures. The more heat absorbed by the solar panels, the cooler the parking lots will remain and the more comfortable urban environment could be created. With solar parking canopy, the energy gained by the PV panels could be used throughout the power grid to power the lights, air conditioning, machines and electrical appliances in the main school building. Parking lot solar canopy installations would be an excellent

installation option not only for High Schools and University but for other public buildings and facilities with large parking areas, such as malls, airports, hospitals and others. Employees or customers would benefit from the shade as the lower internal temperature would provide more comfort for drivers and protect their vehicles. The shade of the canopy could also improve the fuel economy of cars that park underneath.

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SUSTAINABLE MANAGEMENT OF OPEN PUBLIC SPACE IN A LARGE HOUSING ESTATE IN SOFIA: INTEGRATING PHYSICAL CHARACTERISTICS AND SOCIAL DIMENSIONS

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ABSTRACT

Designed as social space according to CIAM principles in the second half of the 20th century, the open public space in the large housing estates in the periphery of Sofia was transformed for the recent 30 years due to the changing socio-economic, political, and cultural conditions. The broad open spaces have been adapting to the arising societal demands, changing lifestyles and mixed uses by accommodating competing or complementary uses, generating new activities or "waiting" update or re-design. The paper discusses the potential of integrating social dimensions and physical characteristics for sustainable management of open public space in large housing estates. Based on a case study approach developed within on-going research project, the paper summarizes the results from the set of conducted qualitative and quantitative methods, spatial analyses, and participatory activities in the URBiNAT Living Lab in Nadezhda district, Sofia. Urban open space is analysed as territorial asset and through the social practices thus revealing the complexity of overlapping roles, users, and audiences. The perceptions, attitudes, dreams, and aspirations towards public space as well as the motivations and liability to participate are studied from the perspective of pupils, citizens and district administration staff. The research findings outline the need for reinventing urban policy by integrating the right-based approach into all phases of public space lifecycle management, (re)considering traditional property and ownership paradigms, building new frameworks for participation and meeting local institutional efforts and bottom-up movements, establishing dialogue with diversity of actors, and providing flexible design that enables multiple interpretations and uses.

Keywords: *urban open public space; large housing estates; URBiNAT; integrated approach; participatory urban planning and design*

1. INTRODUCTION

Public spaces are the essence of the urban advantage as they favour urban prosperity; sustain the productivity, social cohesion and inclusion, the civic identity and quality of life in cities. Since the 19th century, urban reformers, city planners, and municipal officials have claimed that public space serves a number of social and political ends, from public health to cultural assimilation, while the production of public space is now interpreted as 'a normative goal unto itself' (Schmidt, 2008). The liveability and evolving attractiveness of public spaces depends very much on their quality and whether they welcome potential users to walk, stay, sit, or otherwise enjoy them (Gehl, 2004). The desired pleasant environment can be guaranteed only through the proper management and maintenance of public space or through the introduction of changes and improvements where deficiencies exist. Usually public space management is based on planning action, and focused on treatment of place, whereas less attention is paid to the way socio-spatial relations are being conceived. This study looks beyond the debate about 'procedural' and 'substantive' understandings of socio-spatial relations into their practices (Graham, Healey 1999) thus focusing on the interplay between physical characteristics and social dimensions of public space lifecycle management in the context of a post-socialist large housing estate (LHE) in Sofia.

2. RESEARCH CONTEXT

The debate on how space is produced and experienced and by whom started in 1960s (Lynch,1960, Jacobs, 1961), and was later supported with the notion that urban environment shapes peoples' behaviour, knowledge and disposition (Schmid, 2008). The social relations of production of space have social existence to the extent that they have a spatial existence; they project themselves into a space, becoming inscribed there, and in the process producing that space itself. (Lefebvre 1992) The structure of social space manifests itself in diverse contexts, in the form of spatial oppositions, and in the appropriated physical space functioning as a spontaneous metaphor for the social order. Social space is inscribed both in the objectivity of spatial structures and in the subjectivity of mental structures, which are in part the product of the embodiment of these objectified structures (Bourdieu, 2018). Inscribed in physical space, social spaces can be modified only at a cost of transformations of the built environment, changes of lifestyles and gentrification. This fact initiated the interdisciplinary research interest in examining the role of power, race, gender, identity, and representation in public space. The social interaction among individuals with diverse interests, opinions and perspectives was further encouraged by the democratic ideal that emphasizes diversity, difference, and the belief that the needs and desires of diverse citizens groups are met by creating universally inclusive spaces (Young, 1990).

Transforming spaces into places is existential activity, as through the creation of places people visualize, memorize and thus stabilize constitutive human goods such as the sense of belonging, social integration, purposes that give meaning to life and the sense of self (Williams and Giroux ,1992). Among the general concepts of the relationship between people and their local spatial settings is the "sense of place", complemented with the concepts of place attachment, place identity and place dependence (Jorgensen and Stedman, 2001). People-place relationship is also shaped by the time spent in a place. When a person or a social group transforms spaces to places through direct experiences and interactions, it becomes part of the person's or group's "self"(Greider and Garkovich,1994) and may bring about a sense of responsibility for that place, as its loss or damage threatens the group's or person's self-identity (Breakwell,1986). A correlation exists between sense of place and sense of responsibility or commitment to it. A strong sense of place can also provoke people to increase the levels of concern about its management practices. (Williams and Giroux ,1992)

Residential areas as places accumulate memories of people's place-related identity and form the sceneries of people's everyday social interactions. In this perspective, public space acts as a mirror, which reflects the characteristics of the residents, and especially their way of relating to their immediate environment. Personalization of space demonstrates the attachment to a public place and strengthens the residents' sense of identity. A place diversifies individual's experiences of the surrounding space thus bringing about a unique sense of the neighbourhoods. In this sense, public spaces are recognized and valued elements of the urban structure and a means to increase the legibility of the LHE's spatial structure. (Bonenberg, 2015) Public place, being a determinant of space, brings about specific relationships with the housing estates, the groups of multifamily buildings and the single building. Open space enclosed between the buildings and streets represents a significant and irreplaceable potential for increasing residents' quality of life. While the majority of the research projects focus on the LHEs's current policies and programs for physical renewal of the residential buildings, it was recently realized that physical solutions alone may not always be sufficient since many of the problems of the LHEs are often social in nature. (Aalbers et al., 2004)

The large housing estates (LHEs) in Sofia were built in the period of intensive industrialization and urbanization after 1960 in order to meet the high housing demand by building around 15 housing estates, some of which located on ex-agricultural land at the city periphery. About 575 000 inhabitants (47% of the city population) presently live there, while nearly half (47.3%) of the housing stock in Sofia was built in the 20 years between 1970 and 1990. (NSI, 2012) Depending on the period of construction and size, the housing estates built under centralized planning are structured into residential micro-regions, with service centres of different size. According to the urbanization theory and practice at the time the basic structural units called micro-regions had to shelter 15,000-20,000 residents and to provide set of services, among which a school within the pedestrian catchment area. Each micro-region was divided into housing groups with a population of 2,000 to 3,000, where the criterion was the kindergarten catchment area. Later, in the 1970s, this system deals with much larger numbers: a housing district of 40,000 to 50,000 residents, complete with medical facilities, cinema, etc.; and a planning region of 100,000 to 200,000 residents complete with a hospital. (Tashev, 1972)

The societal changes and the economic crisis of the early 1990s and the long period of transition towards market economy, proved that LHEs were perceived as a major urban challenge. Among the main interrelated processes that affected public space are: the legal changes concerning urban property ownership and the general retreat of the public sector from responsibility for maintenance the public space. (Andersen et al, 2013)

Another major shortcoming of the construction of the LHEs is the time lag between the construction of the housing stock and the related public buildings and public works. This, coupled with the rapid changes in the legislation on restitution of the non-built plots of land and suspected corruption, brought to chaotic building of new houses and facilities on 'restituted' land in the large housing estates, and especially on the open green public space, which in some of the LHEs comprised almost half of their areas in the 1990s. The economic restructuring brought about great differences between the social positions of different groups and communities, and hence in their attitudes towards housing and the housing environment (Hirt & Kovachev 2006). These processes significantly affected the state of the public space in the context of increasing car ownership and insufficient parking space competing streets, sidewalks, pedestrian alleys and greenery along the streets. The green elements, mainly trees, planted at the time of the LHEs construction, now provide valuable ecosystem benefits, while other green elements as bushes and grass are deteriorated or missing. Some of the assigned green areas by the initial plans of the LHEs were never implemented and are today either occupied by private facilities or abandoned and invaded by ruderal vegetation.

The main challenges on the local level of urban management today are related to the maintenance and upgrading of the streets, inter-block green areas, playgrounds, facilities and urban furniture. Several attempts to regulate the ownership of inter-block spaces and the level of responsibility of citizens and city administration were discussed during the preparation of the Comprehensive development plan of Sofia and Sofia municipality (2006), but yet not legally adopted until now. Gradually, since 2010 the large non-built up open public space in most of the LHEs has been protected by the adopted detailed urban plans. Most of the activities related to the improvement and maintenance of public green in the last decade were executed by the municipal enterprises and external services providers. The Department "Green System" at Sofia Municipality is responsible for a) management and safeguarding of the green system and b) development and monitoring of the green system and c) project implementation for different elements of the green system. Among the Department's day to day tasks are the rehabilitation of the vegetation, the public works in the parks and gardens, activities related to soil and vegetation recovery, management of the public register of trees and green areas. The design and the implementation of plans for green infrastructure development are usually delegated to private sector agents that are selected through public procurement procedure without securing the long-term involvement of the actors. The financial inability of Sofia Municipality to take care and maintain the large green areas and their equipment brought about inequalities in terms of access and quality of open public space and facilities. In order to test participatory budgeting and improve the policies for citizens' empowerment, the Department initiated the "Green Sofia" Municipal Programme thus supporting bottom-up initiatives for restoration of green areas within the LHEs in the city since 2011. Thus one of the three municipal programmes funding citizens' projects, Green Sofia, provides planting materials, park furniture, and landscaping assistance to the citizens as main beneficiaries of the granted projects. Between 2011 and 2018, 890 projects were implemented under this specific form of participatory budgeting. The main shortcomings of this programme are: a)the missing long-term interaction between the administration and the projects' agents; b)the inappropriate choice of planting materials that need intensive care; and c)the limited choice of the catalogue of both planting materials and urban furniture offered by third parties and provided to the beneficiaries.

3. RESEARCH METHODOLOGY

URBiNAT Living Labs in Porto, Nantes and Sofia are focused on the grounding of the conceptual action of the Healthy corridor. The meanings ascribed to the Corridor are the focus on the intermediate spatial scale of the collective use, the return to the liveable street life and to the public open space as a means of connecting social and urban cohesion. Major characteristics of public space within these residential areas, adopt the notion of 'social space', and use empirical examples to explain the importance of proper public space design, management, and maintenance; the meaning of social space to the residents; and its importance in fostering social interaction and social cohesion. Except mitigating physical and psychological illnesses and socio-economic inequality, the health aspect of the Corridor focuses on the co-creation and spatial appropriation of nature based solutions (NBSs) as means to improve living conditions and microclimate. The living lab in Nadezhda district, Sofia is envisaged as an arena for integration, reinvention, democratic innovation and securing the right to the city. Main actions of the project focus around the mix of objectives: a) to address the inhabitants' needs, expectations and desires to transform architectural practices, b) to test social innovation, and c) to implement inclusive urban regeneration of public space. The Healthy corridor design and future implementation opens the discussion on how the designers, the city and district administration approach and establish dialogue with diversity of actors to build upon communities' assets and large open green space in order to overcome the established and rising challenges due to cultural, social, and intergenerational differences. This paper focuses on the results from the co-diagnosis of URBiNAT study area, which according to

the project's methodology is the first step among the other phases of the co-creation process of the Healthy corridor: co-diagnosis, co-selection, co-design, co-implementation and co-evaluation.

Located to the north of Sofia city centre, and in the south-eastern part of Nadezhda administrative district, the URBiNAT study area covers an area of 115,16 ha and comprises 5 neighbourhoods with 37 770 inhabitants of 17 069 dwelling represented by multifamily mid-rise (from 10 – 15 m height) and high-rise (over 15 m height) apartment buildings. Most of the buildings were built in the period 1960-80s. (NSI,2012) Designed once as a hierarchical system, urban open space in Nadezhda district combined different typologies in terms of functions, space and size. Unsafe and shrinking public space is subjected to competition of users with competing needs and aspirations, invasion due to privatization; decline and loss of walkability due to the lack of paved walkways; existing barriers as fences or new buildings on restituted land; missing shortcuts and connections. Undisputable assets of the area are the already established communities that are proud of the vast open public space, and the greenery. The protection of the non-built public urban open space was institutionalized by the detailed urban plans of the housing estates, adopted in the period 2013-2015, soon after the opening of metroline in 2012.

The research framework for sustainable public space place management in LHEs is focused on the interrelations between physical/spatial social/cultural aspects of space that transform space into place in close relation to institutional and management issues. The interplay between physical/spatial and social/cultural aspects of space is significantly dependent on (non)efficient use of assets, practices and interactions with (non)communicative users. The meeting point and dialectic relationship between physical/spatial dimensions of public space and its institutional management is defined by the planning processes, procedures, tools and the capacity to handle them all together. Social and cultural dimensions and institutional management interact on the basis of norms, communication, and inclusion of possibly wider variety of actors. (Fig.1)

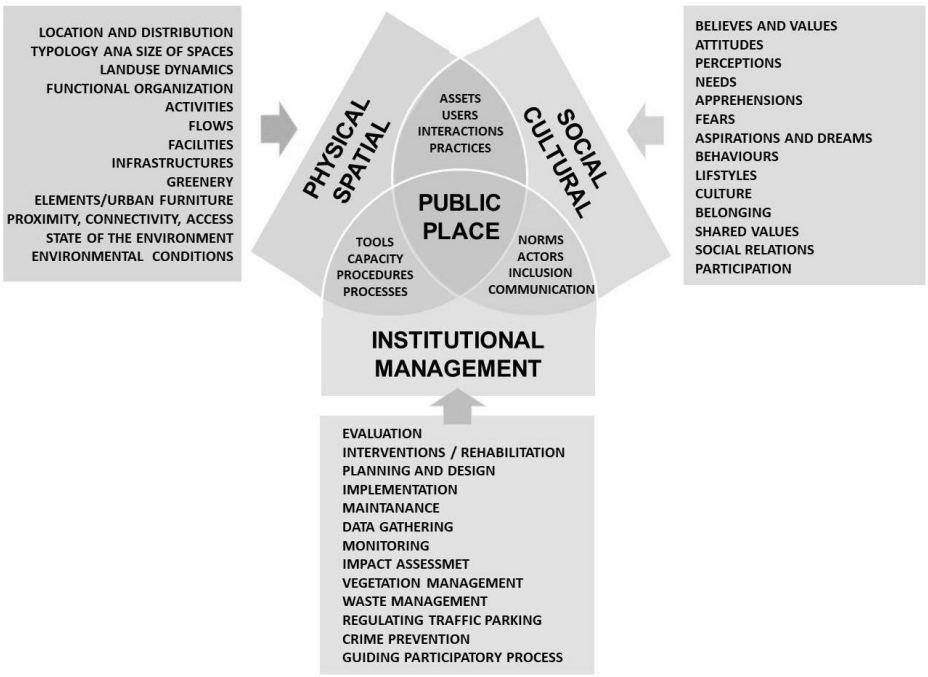

Figure 1: Framework for sustainable public place management in large housing estates

Three research questions and the corresponding methods applied in the period January-November 2019 are presented on Table 1. The summarized results present the discourses of three main groups of open public space users: inhabitants, pupils and representatives of the district administration. In addition, the analysis of the physical characteristics of public space counts on the experts' evaluation. Main topics in this juxtaposition are; a) the characteristics and the assessment of urban open space, and b) citizens' perceptions, needs, dreams, apprehensions and fears, beliefs and attitudes (related to rights and obligations), and tensions.

Table 1: Research questions and methodology

Research question	*Research methods applied*
1) How experts access the characteristics of public space?	*direct observation, functional and spatial analysis, territorial mapping, behavioural mapping of 19 sites, walkthrough and photo voice*
2) How are behaviours, needs, apprehensions, and aspirations of public space users in LHEs interconnected to the physical characteristics of public space in LHEs?	*direct observation, functional and spatial analysis, territorial mapping, 3 focus groups, 10 in-depth semi-structured interviews, cultural mapping, walkthrough and photo voice, behavioural mapping*
3) What are the different approaches, arguments and motivations to collaboration and participation for public space management?	*3 focus groups, 10 in-depth semi-structured interviews, walk through, motivational interviews*

4. RESULTS AND DISCUSSION

1) How experts access the characteristics of public space? Physical characteristics of public space are related to a) the formal and informal paths and possibilities to move from one place to another, b) the typology and existing condition of the greenery, and c) the availability and quality of any equipment and urban furniture in urban public space. The informal paths are almost evenly distributed among the housing estates, demonstrating strong relation between the length and ownership of the plots – the longer the informal path, the higher possibility to pass through vacant or abandoned plots. Formally, there are no legal restrictions for the improvement of their condition and configuration in order to answer to the local needs. Reconsidering property rights and shared responsibilities between the local administration and condominium owners may result in transformations and better maintenance and stewardship of the access and safety. The formal paths and crossways are almost integral part of the street space and the pedestrian network, but yet unreliable under extreme weather condition and for non-motorized users. The delegated to third parties mowing and cleaning of the open green spaces around the housing estates in the recent years contributed to higher accessibility of the informal paths throughout the year.

At other locations, due to diminishing number of inhabitants, such paths almost disappeared. Jaywalks and bridges are scarce, hardly accessible, narrow and dimly lit. In order to provide better accessibility, higher capacity of the facilities and safety should be provided. The number of zebra crossings is insufficient compared to the big number of unregulated crossings, poor visibility and missing traffic calming measures. Crossing the borders between the neighbourhoods and those with the neighbouring areas is still a serious challenge to be solved, especially at some of the locations with intensive traffic and existing physical barriers. The subways, providing main access to the metro stations, may be reconsidered and promoted as an alternative to crossing the boulevard. Green areas and trees are not maintained on regular basis, which creates more shadowy and branchy areas, streets' sidewalks, and inter-block spaces. This is an issue of comfort and friendliness of the environment, but also of safety due to the lack of openness and visibility. The tree coverage in the inter-block space is often scattered and fragmented. Although contested, the space in front of the entrances of the blocks reflects the uniqueness of each condominium, as the small scale public places represent unique collective practices of planting fruit and decorative trees, creeping wine yards, and flowers.

Usually neighbourhood meeting places next to the entrances are equipped by self-made furniture or with catalogue furniture provided by the Green Sofia Programme. Some inter-block public places without special equipment are also liveable due to the parameters and space providing room for choice and coexisting activities at a space with no intended beforehand definition of functions. Many of the sites observed through behaviour mapping are moderately lively during spring (the season of observation), and although they do not offer many amenities, the residents of the neighbourhoods have adapted to them and make them liveable in many different ways. Some places offer limited conditions for staying and stationary activities, while some meeting and exchange points around buildings' entrances, playgrounds and urban furniture attract intensive people's presence. There are significant discrepancies between the areas in which children, women and men concentrate at some sites observed, while in others these gender groups are mixed. Several sites are underused and almost thoroughly abandoned, probably due to their location but also due to the shrinkage of functions and absence of daily occupiers.

a) b) c)

Figure 2: Behaviour mapping results' sample; (a) up –aerial view of the observed area around 15th school / down – non-motorized flows (12 hours) during working day; b) up - passive activities during working day/ down-dynamic activities during non-working day; c) up-stationary activities during working day (12 hours)/down – stationary activities non-working day (12 hours)

Table 2: Assessment of public space, perceptions, needs, dreams, apprehensions, beliefs and tensions

The inhabitants	*The pupils*	*The district administration staff*
Assessment of Urban Open Space. Key: Like (+), Dislike(-)		
+ good transport links and variety of transport modes connecting the area with other parts of the city *+ abundance of greenery* *+ well maintained city park* *- surrounding areas around the waste containers are non-aesthetic and unhygienic* *- stray dogs/cats and people digging around the waste containers.* *- the introduction of one-way traffic greatly prolongs access to the neighbourhood for drivers* *- green areas and trees in open public space are not regularly maintained* *- pavements in poor condition* *-not easy to walk from one park to another*	*+ nice gardens and places for seating in front of apartment buildings that residents maintain* *+ like the new playgrounds and sport facilities in the neighbourhoods,* *- but they do not like the playgrounds in their school yard* *- scattered waste next to the containers* *- appearance of the residential buildings* *- nobody goes to school by bicycle because the sidewalks are broken and uneven, there are no bike lanes, it is dangerous because of the many moving and parked cars*	*+ many children's' playgrounds in the inter-block spaces* *+ well organized space in front of the entrances of the multifamily buildings* *- inconspicuous inter-block spaces - covered with waste, grassy, intact* *- the self-made benches and meeting places in front of the blocks are worn out and made by low quality materials* *- too many cars parked over the green space*
Perceptions		
* *shaded, overgrown with branches and inaccessible areas in the inter-block spaces create discomfort* * *lack of openness and visibility combined with lack of lighting create a feeling of insecurity* * *traffic noise and traffic on the streets and noise in the inter-block spaces in the late evening hours*	* *like and prefer to spend their free time in the large shaded inter-block space opposite the school* * *are concerned about the low level of maintenance of the greenery and scarce furniture in the school yard*	* *feeling that the environment needs more color to become joyful and vibrant.* * *feel that one of the market, organized around small containers, is crowded*
Needs for		
* *well-thought-out and organized maintenance of public spaces and sidewalks* * *more activities in open public spaces and more spaces that invite and provoke activities* * *space for creativity, places to play, and places for elderly to meet and socialize* * *fruit and vegetable open market in the area*	* *more well equipped places to spend free time during the breaks, in the free hours and after classes* * *an organized and well maintained system of sidewalks and paths for walking*	* *vision and action plan for changes in public space* * *educational campaigns to raise awareness of the quality of the environment among young people in order to become active in the future*
Dreams about		
* *harmony between size, colors and shapes of buildings and green spaces* * *making sense and fully utilize the potential of the mineral water spring* * *more space for pedestrians along the streets and in front of the blocks, but at the same time options for car-owners to park*	*"Ideas for change in the neighborhood? - I will start with the buildings' facades, as I find them the most depressing. Then I will change the pavements, renovate the playgrounds, put more zebras and organize safe streets' crossings"*	* *change in the appearance of public spaces.* * *more flowers, benches, energy-efficient street lighting, parking regulations and playground rules*
Apprehensions and fears		

* *threat of development, new construction and the loss of greenery* * *unsafe jaywalking and high traffic speeds along the inner streets in front of the entrances of the multifamily buildings* * *avoid passing along shrubs and ruderal vegetation* * *no way to stop parking in the green areas*	* *afraid to go through the forest near the stadium because suspicious people often gather there* * *afraid of stray dogs and do not sympathize to stray cats* * *avoid lush vegetation because of the insects and animals that inhabit it*	* *concerned about the maintenance and protection of playgrounds against vandalism* * *concerned about maintaining a safe environment*
Beliefs and attitudes – rights and obligations		
* *realize the differences in the inhabitants' needs and expectations towards public space* * *feel obliged to speak from the name of a group and to name the needs of the others* * *usually very busy when asked to demonstrate commitment, volunteering and involvement*	*There is no place for teenagers in the open public space in the HEs. They are ssupposed to be in schools, gyms or if they want to meet their friends - in cafes or clubs, movies or to a more interesting meeting place.*	*Acknowledge responsibility for lighting, visibility (maintenance of municipal plots, including mowing and cleaning shrubs), safety*
Tensions		
* *consider that young people gathering in the open public space make too much noise* * *consider that pupils should not use the equipment of the neighborhoods' meeting places* * *do not appreciate good lighting in the inter-block space as it "invites" noisy groups in the evenings* * *waste in public spaces is a shared responsibility of residents and administration* * *people from other communities are required to volunteer in order to use the equipment of the neighborhoods' meeting places*	* *do not understand why residents do not allow them to use the benches in front of apartment buildings* * *do not approve pets' walking with their owners in the school yard* * *annoyed with a privatized public space (fenced garden) in front of the block* * *do not approve the noisy groups of youngsters gathering in the inter-block space*	* *The presence of good lighting in the area of some playgrounds in inter-block spaces is a prerequisite for gathering noisy companies in the evening* * *Inconspicuous inter-block spaces (covered with waste, grassy, intact) are result of the lack of initiative and good organization of people*

2) How are behaviours, needs, apprehensions, and aspirations of public space users in LHEs interconnected to the physical characteristics of public space in LHEs? The summarised results in Table.2 outline inhabitants', pupils' and local administration representatives' assessment, perceptions, needs, dreams, apprehensions, beliefs, attitudes and tensions regarding public place and mostly reflecting the physical aspects of public space. The results confirm that space and people are integrated in a two-sided interconnection. Citizens and pupils outline that the neighbourhoods are provided with sufficient infrastructure for motorized flows and are well served by public transport, while at some places and areas infrastructure for walking and biking is missing or inappropriate. The three groups involved in the co-analysis recognize the well maintained space in front of the entrances of the multifamily buildings and the abundance of greenery, but dislike the scattered waste, the poor condition of the furniture and the poor maintenance of the large open inter-block public space. Perceptions are mostly determined on the repeated every day activities, daily routines and spaces occupied during free or leisure time. Citizens and pupils value the mature greenery and the tree canopies; citizens are not comfortable with the traffic noise along the busy streets and the noisy groups gathering in the evenings; pupils are much concerned about the poor quality of the pavements and the missing facilities and furniture in the schoolyard. The identified needs are directly connected to physical and mental determinants of health varying from needs for walkable connections and feeling of safety to needs of equipped space for leisure and recreation, creative action and socializing. Dreams are referred to harmony between buildings and open public space, safety, and availability of opportunities for meaningful activities and choices for spending free time. Apprehensions and fears are connected to the loss of greenery and public space due to construction or parking, unsafe jaywalking, and the growing shrubs and ruderal vegetation at some abandoned sites. In addition, pupils are afraid of stray dogs and cats, and of suspicious people that they tend to meet while going through the forest on their way to the sport facilities. The district administration staff is mostly concerned about safety and vandalism over amenities and urban furniture. A significant mismatch has been identified between the beliefs concerning rights and obligations for public space management, which in terms leads to tensions between inhabitants and users of public space, young people and elderly inhabitants, condominium owners and pupils, inhabitants from different communities, and inhabitants/communities and local administration staff.

3) What are the different approaches, arguments and motivations to collaboration and participation for public space management? Based on the analysis of the understanding about the rights and obligations and the arising tensions, different arguments were identified that give insight to the culturally rooted and rising intergenerational differences to the approaches and motivations to collaboration and participation among inhabitants, pupils and representative of the district administration. The inhabitants consider that people are not very active and interested in participating in the improvement of the urban environment. Children are seen as a "channel for influencing and motivating for action, therefore it is considered that parents of pupils and children should be encouraged and engaged to participate and motivate other friends and parents. The pupils

declare that they are ready to participate in cleaning public spaces and building urban street furniture. Young people aged 19-27 were ready to participate at the very moment of the conversation and they clearly demonstrated loss of interest in the successive contacts. The district administration admits that the biggest challenge in the process of changing public spaces is working with citizens. Inhabitants want to study how to to take part in activities (meetings, discussions) related to their neighbourhood by being informed in advance through notices distributed to the blocks or near the venue of the meeting. They want to see more signs and posters, informing and motivating the good attitude and care for public spaces and infrastructure. This information should be presented in an impactful way, not just as a list of prohibitions and obligations. Pupils are willing to participate, but they outline that they need somebody to guide and instruct then on how to perform transformative activities. Representatives of the district administration believe that there is potential to improve the two-way dialogue and dissemination of information related to the municipality's actions and plans for sustainable development. They admit that they recognize the lack of a mechanism for applying "punishment" in cases of pollution of public spaces – one of the main reasons for the poor condition of the inter-block spaces. The recognised diversity by the three user groups represented in this report, outline the important role of the co-evaluation and effective control during public space co-creation process since the very beginning of any initiative of upgrading or planning for new development of urban public place in residential structures, and in particular in LHEs.

The strengthening of public awareness of the resources and potential of urban public space and the problems associated with its maintenance, protection and management is a needed action. From one hand this would facilitate public control over the distribution of the funds for the maintenance, management and design of public spaces, and on other hand it would better connect the planning process with the control of the implementation and day-to-day management tasks and investment plans. Control is essential for the credibility of the public space quality management, as the loss of credibility leads to loss of motivation among residents to collaborate. The right to choose the projects through participatory forms of budgeting and to control the design and management of public place in LSHs. Co-creation and co-management are strong empowerment tools that trigger a sense of pride and satisfaction with the outcome, reduce vandalism and anti-social behaviour, strengthens ties among neighbours, and develops sustainable communities.

4. CONCLUSION

Creating high quality public space in LHEs should be part of long-term collaborative integrated regeneration and development strategies that reconnect neighbourhoods with the city structure, develop mix of functions based on the communities' needs and local assets through improving public space and place making. Public place management should be aware that public space fulfils diverse functions and because of this, local conditions and residents' needs should be taken into consideration by applying the principles of universal design. Communication of local/district administration with citizens, motivating, guiding, and involving are realized need activities that would ensure empowerment. Further studies and future efforts should be focused on building frameworks and formal arrangements for participation by clearly defining the places and times to enable participation. In order to feed policy analysis, planning and design processes, new way of data gathering and approaching public space management should enhance better study and assessment of the cause-effect relationship between physical characteristics and social dimensions of public place. The presented study proves the need of analysis of the problems and opportunities of public open space in terms of existing morphologies, current practices, and potential to accommodate functions and make residents' dreams come true.

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ICUP2020
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COMMON OPEN AREAS AS INTERACTIONAL SPACE IN SOCIAL HOUSING - DESIGN PRINCIPLES AND SPATIAL CHARACTERISTICS

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ABSTRACT

A significant problem that accompanies social housing is the issue of social exclusion of their users. This phenomenon negatively affects the quality of social housing and can often have wider negative effects on housing surroundings. Low socio-economic status is a factor that is de facto present among the users of social housing and which certainly adversely affects the problem of their social exclusion. However, recent studies show that the problem of the exclusion of social housing users can be approached from the aspect of improving the spatial organization of facilities planned for this purpose.

Namely, it has been shown that the existence of spaces in the vicinity of social housing that support the socialization of the users can significantly affect overcoming the problem of social exclusion. Through appropriate planning and design principles and measures, that influence the development of spatial capacities which can support and encourage social interactions, the inclusion of social housing users can be improved. One of the measures implies the development of common open areas as interactional space. The paper will present design principles and spatial characteristics of shared open areas which implementation could contribute to the higher intensity of social interactions within them.

Keywords: *common areas; design guidelines; interactional spaces; social housing; spatial characteristics; urban planning*

1. INTRODUCTION

A significant problem that characterizes the development of social housing is the social exclusion of its users. The consequences of this problem are reflected in the limited social development of users and their social marginalization (Henning, Lieberg, 1996; Bridge, 2002; Tunstall, 2011). The issue of social exclusion of social housing user is very complex, and can lead to serious development problems, such as discrimination, difficulties in their socialization, segregation and etc. (UN, 2006).

As the improvement of the socialization can influence the overcoming of the problem of social exclusion, the focus of this paper is to determinate the spatial characteristics regarding the design of social housing that can positively affect the socialization of its users.

1.1. Development of common areas as interactional space to support the socialization of social housing users

In order to support the socialization of social houisng users and thus contribute to their social inclusion the physical framework of this type of housing has to be design in a manner to create and promote opportunities for social interactions (Gehl, 1987; Cambell, Cambell, 1988; Faridan, 2013; Petkovic Grozdanovic, 2020). As the opportunity for social interactions increases by intensifying the levels of physical contact in a space, the existence of common spaces within the complex of social housing which would initiate and supported interactions among tenants, can positively affects the quality of this type of housing (Gehl, 1987). This primarily refers to spaces which are developed, organized and equipped with spatial and physical elements able to support meetings, informal gatherings and association of users (Huang, 2006; Catell, 2008; Faridan, 2013), ie to provide the support for more intensive development of social interactions.

The existence of common spaces within the complex of social housing is necessary due to the problem caused by limited mobility of its users (Bridge, 2002; Tunstall, 2011) and their wide demographic range and present social differences. Providing the opportunities for all of them to participate in joint activities influence the cognition and acceptance of diversity and thus facilitate their integration into the narrower and wider social community (Cattell et al., 2008). In addition, the utilization of such spaces is not exclusively oriented toward users of social housing. It is desirable that neighbors from immediate surrounding also use these contents, in order to strengthen the social and community spirit of the neighborhood (Tallen, 2008). The mixing of different economic and social strata improves the living conditions of the poor, through the "role model effect", and contributes to the prevention of fear and prejudice among wealthier neighbors - which encourages interaction and neighbors' cohabitation.

Some studies have shown that certain spatial characteristics of common areas can significantly improve the intensity and the course of social interactions. Therefore, the focus of this paper is to identify and determine those spatial elements which implementation would have positive effect on social interactions and thus contribute to socialization of the users of the social housing.

2. SPATIAL CHARACTERISTICS OF COMMON OPEN AREAS AS INTERACTIONAL SPACE

The overview of the conducted studies and researcher on the matter of common open areas and their possibilities to increase the intensity of social interactions are: 1) spatial capacity, 2) position, 3) spatial organization and 4) equipment of these areas. In the continuation of the paper, the focus will be on the above mentioned elements of common open areas which are of the greatest importance for the development of social contacts.

2.1. Spatial capacity

Generally, regarding the spatial characteristics of common open areas the first prerequisite is their capacity. According to design guidelines, minimal area of shared common space should be least 1sqm per resident or 5sqm per apartment (SUHDSNA, 2018).

However, since the spatial capacities in social housing are often very limited, in order to create shared common space able to influence the improvement of social interactions, their area should be defined with at list 25% of the total plot area. Such area is exclusively oriented toward free-time activities. The other common amenities, such as pedestrian paths, parking and etc. should not be take in calculation of this percentage.

2.2. Position

Beside their very existence the additional requirement of common open areas, in order to improve the social interactions, is to be visited. The readiness of an individual to initiate or be a part of social interactions is primarily influenced by the fulfilment of requirements in terms of privacy and security. Familiar or known physical environment and perception of who the possible encounters are, provide favourable conditions for establishing mutual contacts between the tenants from the immediate vicinity and thus improve the possibility of their socialization.

In addition to the readiness of individuals to establish social contacts, in the physical sense the common spaces should be planned in a way to enable informal gatherings and joint activities.

The access pedestrian paths to the buildings, by their nature, are the most frequent ones. Therefore, the development of interactive space is oriented mainly towards upgrading their initial role. This action is based upon the prerequisite that the level and intensity of usage of pedestrian access paths are a guarantee of their attendance. However, some studies regarding the organization of the interactive spaces in the vicinity of pedestrian paths indicated certain shortcomings of such concept (Abu-Ghazzeh, 1999; Huang, 2006). Their transit character, although guarantees their attendance, has an anti-simulative effect on the development of social interactions due to their incidental use (Huang, 2006). The best solution for the development of interactive spaces is to locate them in the immediate vicinity, but sufficiently separate from transit pedestrian routes. The position near the intersections of pedestrian paths has been recorded as the most favourable ones, because the highest level of the social interactions in them (Abu-Ghazzeh, 1999) (Figure 1).

If such an arrangement of interactive spaces is not possible and they need to be planned and organized in remote areas, the alternative is to connect them to other dominant facilities or services present in the nearest surrounding. This should be enabled through the formation of smaller common areas join with sidewalk (as intermedia space and a bond to this facilities) as link a to the main common open area. The connection to remote common area should be enabled through several broader paths – thus providing good visibility and safety use of distant contents.

The common open area of the *Formosa 1140* social housing in Los Angeles, US is design in a form of a “pocket park”, by positioning the dwelling closer to the western border of the plot and forming a large, free space on the east side (Figure 1). This space is directly connected to the access streets on the south and north sides of the plot. The space is intended not only for the residents of the dwelling, but also for the neighbours from residential surrounding. Green niches intended for sitting and gathering are formed by meandering the main pedestrian communication.

Figure 1: *Formosa 1140* social housing, Los Angeles, US / Lorcan O’Herlihy Architects (2008)
(Source of illustration: https://urbannext.net/formosa-1140/)

2.3. Spatial organization

As social housing users characterize a very wide demographic spectrum, their needs and preferences in terms of the physical character and the organization of common open areas can significantly vary from case to case. For these reasons, the most favourable solution is to develop these areas as neutral and polyvalent spaces that provide the possibility of multifunctional use (Dinić Branković, Mitković, 2019).

A neutral space is considered the one which is not evidently functionally defined and profiled, in order to be adequate to a wider range of users and utilized according to the affinities of the users themselves. The neutrality of common spaces should not be associated with their monotony or uniformity. On the contrary, these spaces are expected to have a stimulating effect on users and encourage their creativity, thus initiate a

longer staying in order to increase the ability for the development of social interactions (Gehl, 1986; Carr et al., 1992).

As the needs of users can change over the time, these spaces should be planned as flexible (Dinić Branković, Mitković, 2019). The possibility of transforming the space in accordance with specific needs, as well as the opportunity of their personalization, results in a high level of their usage value. In order to improve the inclusion and integration of social housing users in the narrower and wider social milieu, these areas should not be intended exclusively for social housing users, but also for the residents from the surrounding neighbourhood (UN, 2006).

An example of a neutrally designed interactive space can be seen at *Broadway* social housing in Los Angeles, US (Figure 2). By positioning four apartment-building volumes at the corners of the plot, a large inner courtyard is created. This courtyard can be accessed from different points. With the central positioning of the courtyard, this space gained intimacy, while the introduction of a larger number of wide pedestrian connections promote visibility and improve its safety and integration with the residential environment. Inside the courtyard the central part is enriched with tall greenery, circled with common open space that arise from the ground level to the last apartments floor. This space if formed as a three-dimensional wooden structure, primarily intended for a pedestrian connection to the apartments, but with numerous possibilities for the development of additional functions. Trails, ramps, stairs, bridges and open access galleries are dimensioned to enable the accompanying activities, such as: children's play, socialization among neighbours, recreation, etc.

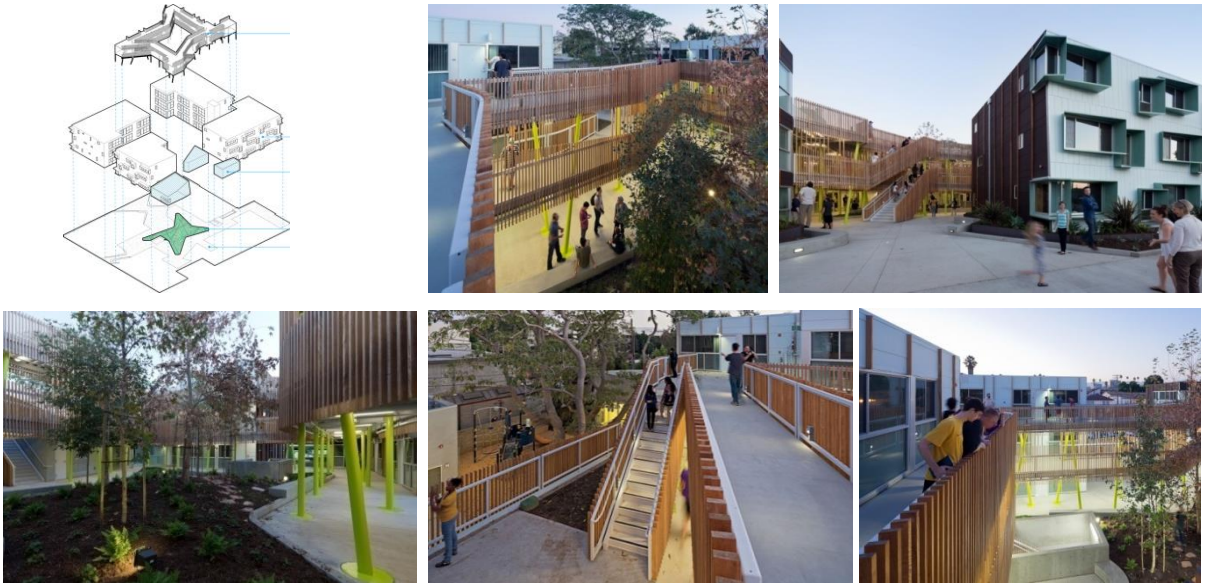

Figure 2: Spatial organization of common open areas – *Broadway* social housing, Los Angeles, US / Kevin Daly Architects (2012) (Source of illustration: https://www.archdaily.com/503233/broadway-housing-kevin-daly-architects)

2.4. Equipment

In addition to the general characteristics in terms of spatial capacity, position and spatial organization, which interactive spaces need to meet in order to be frequently used and therefore promote social interactions, studies have shown that the type of equipment in them have significant part in the interaction process. Mainly tree urban elements have been found as the key ones and the most important for improvement of social interactions (NSW, 2015): 1) seating equipment, 2) children playground and the space organized for the persons supervising them and 3) greenery. A more detailed analysis of the required characteristics of these elements is given in the text below.

Seating. The existence of seating elements has been identified as the most important for the socialization, because it allows a longer staying and thus increases the possibility for the development of social interactions (Gehl, 1986; Carr et al., 1992; Huang, 2006).

In addition to its very existence, the organization of this elements also influences the level of social activity. It has been shown that grouped and concavely organized sitting element have more positive effects on the development of conversation and informal communication (Campbell and Campbell, 1988). These forms

enable visual contacts with other users of the space, which encourages interaction, unlike individually positioned elements or grouped in a convex form.

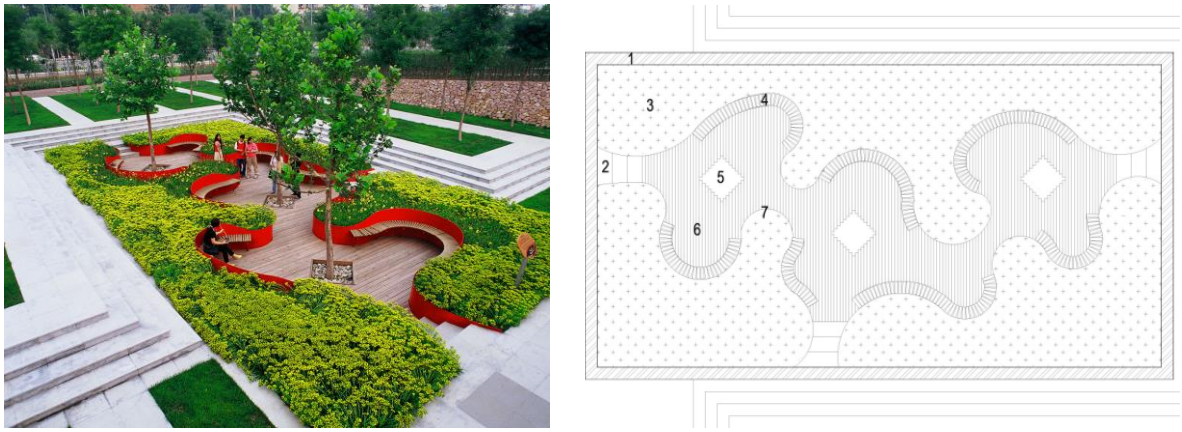

Figure 3: Organization of seating area- Tianjin Bridged, Qiaoyuan post industrial Park, Tianjin, China / Tunscape architects (2008)
(Source of illustration: https://divisare.com/projects/244824-turenscape-bridged-gardens

Children playground. In addition to the fact that playgrounds are used very intensively, because the youngest has the most pronounced needs for outdoor activities, it has also been noticed that the presence of children have significant effect on the provision of social interactions in the neighbourhood and the formation of stronger social ties (Huang, 2006; Faridan, 2013). Playgrounds do not only initiate interactions between children, but also contacts between the persons who supervise them (Huang, 2006; Faridan, 2013). In addition, the manner of the space usage - the frequent present of the same children, i.e. the same parents - has a favourable effect on the further development and strengthening of the social ties.

When it comes to the design of these areas it is necessary to consider sustainability issues. Playgrounds should not be strictly profiled. It should be design to support different activities, regarding children age, gender and individual preferences (Figure 4). These places should be affordable and easy to maintain.

Figure 4: Playground area - examples of affordable and neutral places for children to play
(Source of illustration: left image: https://www.pinterest.com/pin/446982331766369597/?nic_v2=1a5VYP0KW
right imagehttps://architizer.com/idea/72299/)

Greenery. The third element important for the quality of interactive spaces is the presence of greenery (Figure 5). Research have shown that a higher intensity of common space utilization is observed in areas richer in greenery (Krellenberg et al. 2014) thus increasing the possibility to develop social interactions and activities in these areas and influences stronger social cohesion among residents (Kweon et al., 1998; Huang 2006). Within green spaces a wide range of different demographic profiles can be found - children who use them as a space for play, young people who use them for sports and meeting, adults who most often use them for leisure or to supervise their children and elderly who use them as a spaces for socialization (Catell, 2008). Such demographic

image contributes to social diversification, which is crucial for the development of quality and inclusive social housing environment.

The intensity and level of the attendance to green areas and its duration largely affect the present biodiversity. Research has shown that the presence of richer biodiversity in urban green spaces is directly related to the prolonged staying in them, and thus to the level of social activity – because a longer stay automatically increases the chances of developing social interaction. Unlike urban green spaces, no difference in the level of social activity was observed in biodiversity-richer areas in sub-urban locations. However, the primary concern, in the process of urban design and landscaping the common areas is their economy and easy maintenance.

Figure 5: Rich biodiversity - BIGyard, Berlin, Germany / Zanderroth Architekten (2010)
(Source of illustration: http://lepamphlet.com/2013/06/26/bigyard-2)

3. CONCLUSION

The participation of social housing users in social interactions greatly influences the improvement of their socialization, which has a positive effect on their overall life quality, but also on the development of the society as a whole. For this reasons the existence of common open spaces, able to support informal gathering, is one of the main factors of the quality of this type of housing.

In order to substantially improve the socialization of social housing users, it is not enough to just physically introduce common open spaces within the areas intended for social housing. The mere existence of these spaces isn't in any way a guarantee of the development of social interactions. Moreover, numerous practical experiences show that a large number of residential complexes with significant common areas have been completely devastated over time due to low intensity of their usage.

The results of this paper show that the following elements are crucial for the development of quality common, interactional areas: spatial capacity, position, organization and equipment. The existence of such common spaces, in addition to contributing to the improvement of the quality of the social housing and its sustainability, also affects the quality of life of the tenants from the immediate environment – thus promoting vitality and sustainability of residential neighbourhood and consequently society in general.

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BUILDING RESILIENCE THROUGH CREATIVE STRATEGIES IN SMALL POST-SOCIALIST SHRINKING TOWNS

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ABSTRACT

Urban shrinkage has become a common process in many cities around the world. Small towns are especially affected by this process. In Eastern and Central Europe, the phenomenon of urban shrinkage is combined with post-socialist transition, which further worsened the conditions of development in small towns. For this reason, they need complex planning approaches in order to adapt to changing environment and find resilient path of development. Endogenous resources and social capital represent a valuable base for development of small shrinking towns and creative use of them can contribute to creating an attractive, viable and resilient environment in the middle- and long-term period. Analysing local planning strategies in four small post-socialist towns, the aim of this paper is to determine and clarify how creative strategies can contribute to resilience of small shrinking towns. All analysed towns have managed to respond adaptively to change and reinvent their paths of future development.

Keywords: *urban shrinkage; small towns; resilience; creative strategies*

1. INTRODUCTION

Shrinking cities have become widespread phenomenon, charactarized mainly by population loss, which can be caused by different economic, demographic and spatial transformations from global to local level. This phenomenon has received much attention of scholars last decades, but on the other hand, the shrinkage of small towns has not been extensively researched. Their shrinkage is evident, especially in Eastern and Central Europe (Ljubenović, et al., 2018). In addition to general factors, the urban shrinkage in these countries was influenced by the transition from a socialist to a capitalist state system and a large number of post-socialist cities lost their population after 1989 (Mykhnenko and Turok, 2008).

Small towns have been particularly affected by post-socialist transformation. They were often planned as centers of specific industries and economic restructuring was much less favorable to them. The withdrawal of state funding, the lack of interest of private investors, as well as environmental degradation had a particularly

negative impact on them (Stanilov, 2007). These factors influenced the prolonged period of economic stagnation, decreased income and deteriorated quality of life. The weak position of these settlements in the global economic system has further reduced the chances of their recovery.

Transitional reforms in post-socialist countries delayed resolving issues such as urban shrinkage. Shrinking cities were thus ignored, even considered as a taboo topic. The responses to urban shrinkage in these countries are growth-oriented, without reference to the causes and consequences of decline (Bernt, Cocks, Couch, and Großmann, 2012). Small towns are mainly neglected in national and regional policies, which favor larger urban centers and their development. However, small towns have less functions and the effects of demographic decline are very quickly reflected on them (Trócsányi, Pirisi, and Máté, 2018). Therefore, they need complex solutions and improving urban resilience is an alternative to growth (TOWN, 2014).

Resilience is seen in this paper as a capacity of a town to adapt to the changes caused by urban shrinkage by maintaining its functions and structure or by developing new alternative development paths. Cultural and creative industries can encourage the emergence of new types of economic activity in small towns (INTELI, 2011). Therefore, the main research question is if creative strategies can contribute to resilience of small post-socialist shrinking towns. After a brief theoretical review of concepts of urban resilience and creative strategies, this paper focuses on strategic approaches developed in some of the small post-socialist towns in order to cope with urban shrinkage.

2. THEORETICAL BACKGROUND

2.1. Urban resillience

Resilience theory considers urban systems as complex adaptive systems and it introduces a new view on the analysis of the urban structure of cities. It is a dynamic concept that focuses on how to preserve and develop with change, that is, on the ability of people, communities, societies and cultures to adapt and develop in an ever-changing environment (Folke, 2016). Urban resilience represents the ability of cities 'bounce-back' and adjust to shocks and challenges. One possible response to disturbance in resilient system is adaptation, which represents the ability of the system to adapt to different influences and continue to develop along the the current trajectory (Folke, 2006). It refers to the capacity of people to learn and combine experience and knowledge in order to adapt to external influences and internal processes. There is also an alternative view of the system's response to a disturbance, which represents transformation. The ability to transform refers to the capacity to create a fundamentally new system of development when environmental, economic or social conditions make the existing system unsustainable (Walker, Holling, Carpenter, and Kinzig, 2004). This aspect of resilience includes the capacity to rebuild, reorganize, and redevelop by creating new development paths (Folke, 2006).

The social components of the city (actors, interest groups) play a key role in achieving resilience. If adaptation and transformation are possible responses to the disturbance, then actors or interest groups are the agents responsible for implementing those responses (Akmentina, 2017). In this regard, social capital is crucial and it can be defined as the capacity of neighbourhood for collective action (Weaver, Bagchi-Sen, Knight, and Frazier, 2017). A broader understanding of social capital refers to the quality and quantity of social interactions at different levels (individual, community level, locality) that shape institutions, relationships and social norms, creating the capacity to achieve individual and common goals (PRUV, 2017). Building social capital supports formal and informal decision-making and public involvement processes, which can increase the capacity of social interaction and society to solve difficulties (Taşan-Kok, Stead, and Lu, 2013).

According to the resilience theory, cities as complex adaptive systems cross different phases in the adaptive cycle - exploitation, conservation, release and reorganization (Holling and Gunderson, 2002). Shrinking cities are found in the conservation phase, which is less flexible to negative influences and shrinkage represents a result of response to shocks (Figure 1). This way, they can be stuck in a crisis without the ability to start a process that can lead to new choices and development opportunities (Schlappa and Neill, 2013). In this phase of cycle, the future needs to be reinvented based on the changing context and their abilities and strengths that may be different from the past. The learning process in a period of uncertainty, confusion and crisis is a major link between shrinking cities and resilience.

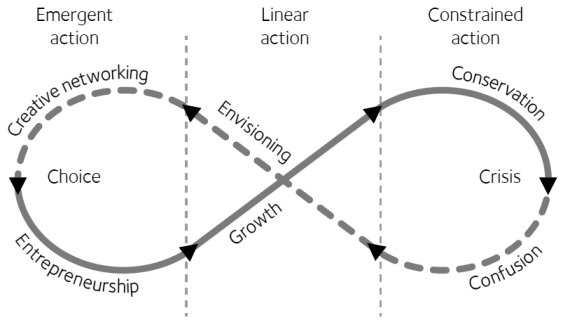

Figure 1: Adaptive cycle of shrinking cities (Schlappa and Neill, 2013)

2.2. Creative strategies in small towns

Small towns have fewer resources and opportunities to face the consequences of urban shrinkage than large cities. The size of their economy is limited as well as human capacity. The regeneration and development of shrinking small towns require innovative approaches and creative-based strategies offer possible solution to the problems of shrinking towns. Recent research shows that small towns can also play a role in creative economies (INTELI, 2011), (Selada and Cunha, 2012), (Noronha and Vaz, 2015). They can contribute to the transformation of declining local economies. The amenities that can attract the creative class are not the same in small towns and large cities. In small towns, they refer to the unique characteristics of the territory, natural or built, with aesthetic, social and economic values.

The presence of creative people is associated with business development and growth in small communities (INTELI, 2011). Their entrepreneurial spirit encourages the development of creative businesses, but in addition, it provides innovation in other areas of the local economy such as agriculture, crafts, textiles, tourism or gastronomy. Building infrastructure or support programs (such as houses and apartments for living and working, creative incubators, gathering places) can attract talent and encourage the development of creative business. These can be both temporary and cheap creative spaces - for example empty spaces and buildings that can be often find in shrinking cities can be used for creative activities at a low price.

When it comes to shrinking small towns, creative strategies should not be seen just as a tool to attract creative people. Since these towns have limited capacity, functions and financial resources, this can be too ambitious goal. Creative strategies, based on local qualities should be implemented in shrinking towns in order to achieve an attractive, viable environment for its own residents and to prevent further emigration.

Conceptual framework of creative strategies is composed of three dimensions (Selada and Cunha, 2012):

1. Governance – the success of creative strategies is related to the leadership and management of the place, but also to the coordination of actors and involvement in the community. Strengthening cooperation at all levels (political authorities, universities, technology institutes, companies, civil society) and promoting citizen participation are important factors in implementing creative strategies.
2. Endogenous resources – natural and built environment, social and symbolic capital, economic activities and cultural amenities.
3. Territorial context - refers to the territorial position, urban density and accessibility of small and medium-sized towns.

Adopted policies and strategies in small towns depend on the context and they should be created based on local resources, whereby every place must find its own creativity. Creative strategies must be flexible, informal and experimental in nature. Small towns can combine different approaches to creative strategies and these can include (INTELI, 2011):

- Physical approach, which is focused on the built environment and mainly relies on programs and instruments of urban regeneration and revitalization.
- Green approach, based on the promotion of the quality of places and quality of life based on natural, historical-cultural and symbolic benefits.
- Thematic approach, based on the certain segment of cultural and creative industries (music, theatre, food).

- Integrated approach - focused on attracting talent and creative industries through the application of integrated instruments with social, cultural, economic and environmental impacts.

3. COMBINING CREATIVE STRATEGIES AND RESILIENCE – CASE STUDY ANALYSIS

Small towns have limited capacity to deal with the consequences of urban shrinkage and generally, in post-socialist towns there is still no clear idea on what approach they should take. In the absence of national policies and programs for the planning of small post-socialist shrinking towns, some of them managed to develop specific economic niche, after the economic restructuring during the 1990's. The case studies include small towns from East Germany and Estonia, and the main reason for their urban shrinkage is economic restructuring after the fall of socialist regime, which influenced unemployment and job decline, and as a consequence emigration. These towns based their development on the creating of an attractive environment as an alternative to the big cites. Their strategies included endogenous approaches closely related to the social capital and managed to adapt or transform their development trajectory.

Colditz, East Germany. At the beginning of the transition, Colditz was an example of a small industrial town, specializing in the production of ceramics (Cudny, 2012). After 1990, the population of Colditz began to decline, from 6,635 inhabitants in 1990 to 4,870 inhabitants in 2009 (26.6%). The causes of urban decline included negative natural increase and negative migration balance due to the second demographic transition, as well as the economic crisis caused by the decline of the industry. As the consequence, the population began to age rapidly, since mostly young people emigrate for school or work. Economic changes have affected functional and spatial changes, which are reflected in emergence of brownfields, the closure of railway network and the closure of only high school.

Due to deindustrialization, the focus has shifted to the development of services, especially tourism. The main attraction of the city are the medieval castle that served as a prison for "Oflag" during World War II, the Renaissance town square, as well as the river Mulde which is used for water sports. In 1991, the town was included in the national and regional revitalization program Bund-Lander-Sanierungsprogramm. Local authorities have formed a special department to support tourism. Financial resources from central and regional funds, as well as from the municipal budget were used for the renovation of the castle and the revitalization of the city centre, which included the modernization of the buildings in the centre, the modernization and construction of new streets and paving, filling the gaps between the buildings. New tourist facilities have been introduced - a youth hostel, a new sports hall with a swimming pool. A large number of NGOs and associations have been formed to address sports, culture and tourism.

The number of Colditz visitors in the period 1999-2009 has tripled, and the number of overnight stays has increased 3.5 times. Due to the rapid development of tourism in 2011, a new strategy of revitalization and further development was adopted. It includes additional landscaping of the square, turning the former brewery into a shop and hotel with incentives from the city (Cudny, 2012).

Grimma in East Germany was an industrial town even before the Second World War and later, during socialism (Burdack and Meschwitz, 2013). After the political and economic upheaval in 1990, the industry was privatized and specialized with small enterprises, thus losing the traditional function of production. Due to the administrative reform in 2008, the city lost its function as the seat of the district, but it still has a strong position as a regional centre for private and public services, which is partly because of its good traffic position near the highway. The population has fallen by -13% since 1990, to 18,900 in 2009, however, these losses are lower than the average of small Saxon towns.

An additional negative influence was the flood in 2002, which destroyed the renovated historic centre and large parts of the infrastructure. The flood was the starting point for many initiatives to rebuild the city. It promoted the unification of citizens through joint work on the construction and reconstruction of the dam. The city was quickly revived, and as a symbolic end to the renovation, the music festival 'Liederflut' (flood of songs) was organized in 2004, which became an annual event. A large number of volunteers participate in it and the public authorities give support to volunteer activities - they reward citizens for exceptional engagement. A 'youth parliament' was launched as a platform for organizing and discussing youth in the city. Incentives are also given for the use of alternative energy sources. After 2002, the town recorded positive balance of migration, which confirms that it became more attractive after refurbishment and retain a positive public image.

Ostriz is located in the border triangle Germany-Poland-Czech Republic, which became known as the "Black Triangle" due to extreme environmental pollution (Burdack and Meschwitz, 2013). Economic restructuring in the early 1990s led to the closure of two coal-fired power plants and the collapse of the textile industry, which improved the environmental situation but the city suffered heavy job losses (about 50% from 1990-2008). This affected the population decline by more than 30% in the period 1990-2009 due to emigration and a very negative natural increase. In 2009, Ostriz had 2,623 inhabitants, but the decline was alleviated after that.

In order to strengthen the local economy, the town turned to sustainable environmental development and became a model of the town with an energy ecosystem and energy self-sufficient. The central energy facility is a biomass power plant, the construction of which was partly financed by the German Federal Foundation for Environmental Protection. The monastery on the outskirts of the city manages a hydroelectric power plant. Private wind turbines have been built, and solar power plants have been installed on the roofs of the building. Households are connected to heating free of charge and the installation of new heating systems is subsidized. In order to launch new initiatives, a civic initiative was formed in 2004, which consists of city councils and interested citizens. Numerous projects have been designed that would contribute to the continuation of ecological development. New initiatives probably cannot replace lost jobs, but they do indicate development prospects for the small town.

Viljandi in Estonia is a traditional district centre in a thriving agricultural region, with relatively vital rural settlements in the area (Leetmaa, Nuga, and Org, 2013). It is one of the oldest towns in Estonia, which is used as a tourist advantage. The population declined from 23,080 to 20,800 in the period 1989-2000, and then the decline was mitigated (19,963 inhabitants in 2010).

The town based its development on culture and tourism, since it has a strong cultural cluster. It has one institution of higher education (the Academy of Culture of the University of Tartu), as well as theatre and every summer since 1992, an international folk music festival has been held. The main actor in cultural activities is a non-governmental organization with partnerships throughout Estonia and beyond. There is strong community support - accommodation in residents' homes and free apartments are offered during the festival, local businesses provide sponsorship, etc. The city administration successfully manages the cooperation between the key cultural actors of the city. Future strategies include more investment in sports facilities in order to obtain more diverse attractions for visitors (for example, a stadium, a rowing arena on Lake Viljandi).

Although cultural events determine the city's image, the cultural sector does not provide enough jobs for all residents. The economic basis is still industry, and some companies existed during socialism, but they are all actively involved in urban development.

Specific characteristics and local potential of the analysed cities influenced different directions and goals of their urban development, which are summarized in the Table 1, along with the identified type of creative strategy approach.

Table 1: Local development strategies in case studies

TOWN	*DEVELOPMENT STRATEGIES*	*TYPE OF CREATIVE STRATEGIES APPROACH*
Colditz	*the development of services, especially tourism based on historic attractions (medieval castle, the Renaissance town square)*	*combined physical approach (renewal and revitalization) with thematic (cultural tourism)*
Grimma	*shock event (flood) as trigger point for many renewal initiatives*	*integrated approach – physical renewal, cultural approach and community engagement*
Ostriz	*a new orientation of the town's development as an "ecological model"*	*green approach – promotion of the new town identity as place with a healthy environment energy self-sufficient*
Viljandi	*specialization in the field of culture and tourism - a combination of traditional industry and cultural cluster*	*thematic approach - establishing a strong cultural cluster around cultural institutions and an international folk music festival*

Analysed towns have managed to establish a new development path based on their local characteristics in order to compensate for their peripheral position. A common goal of the development of these towns is the creation of an attractive environment. Starting from that, they developed various approaches to creative strategies. Endogenous resources have been used to develop different creative strategies, based on realistic strategic goals. They were identified with the action of internal factors in the form of networking of local actors and social capital, as well as external impulses in the form of expertise and financial incentives. The development strategies applied in these towns have mitigated their depopulation. By adaptively responding to change, they have built urban resilience as transformation. The towns did not return to the previous state, but passed to the new one, which is more sustainable in the current environment.

Based on analysis of different strategic approaches of shrinking small post-socialist towns, a conceptual framework was formed for the implementation of creative strategies for achieving resilience (Figure 2).

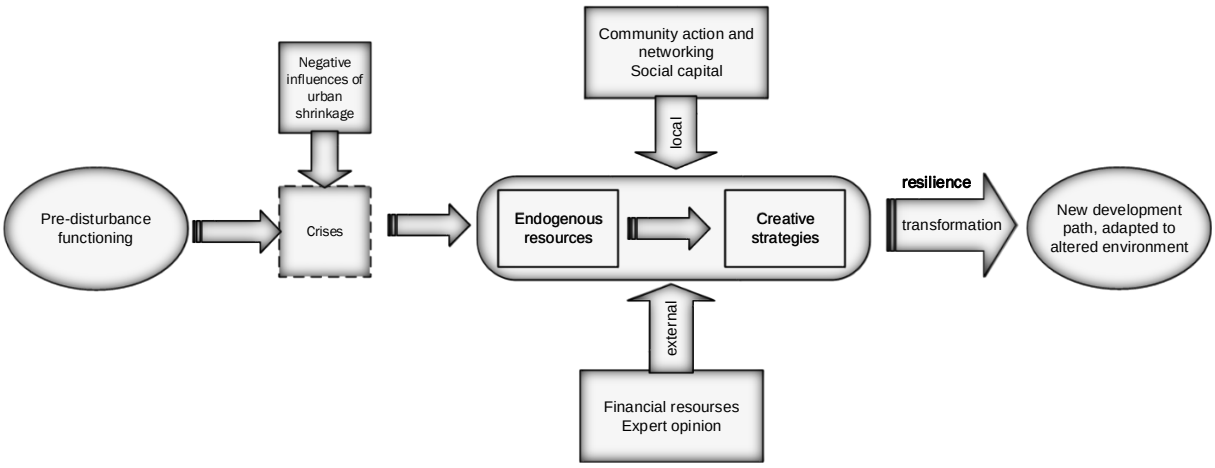

Figure 2: Conceptual framework for creative strategies approach in shrinking small post-socialist towns

4. CONCLUSION

The analysis of selected examples of small shrinking post-socialist towns show that although urban shrinkage may cause a crisis, it can trigger a process of development based on new chioces and opportunities. This way, a town can finish an adaptation cycle and manage to preserve resilient development path. Resilience, in this case, is not just 'bouncing back' and returning to a state of pre-disturbance functioning, but a creative change and system's capacity to adaptively respond to disturbance and support long-term positive dynamics. This view of resilience as a dynamic process of continuous development and transformation accepts change as inevitable and focuses on the adaptive capacities of the community, rather than on vulnerability, and allows it to develop further. The system does not return to the previous state, but passes to the new one, which is more sustainable in the current environment.

Creative strategies can certainly contribute to the resilience of small shrinking post-socialist towns, as it is shown in these examples. However, in order to produce adequate results, they should be based on the specific local characteristics potentials, according to which realistic and effective goals should be developed. This is important because shrinking towns are confronted with limited resources and capacity to meet too ambitious goals. Local networking and social capital play a key role in the process of decision-making as well as in the implementation of proposed measures. In addition, because of a limited town budget and lack of knowledge, they need help from a higher levels of planning and governance in a form of financial incentives and knowledge exchange. In this regard, cooperation and networking with other towns or cities is important in order to join their resources and share knowledge and experiences. This could also prevent copying strategies, because every town needs to develop its own creative strategies (e.g. not all of the towns can be tourist destinations).

It is important although to remark that shrinking small post-socialist towns should not base their future development only on creative strategies. They need to be a part of a broader integrated strategy of local development and well connected with urban planning, economic policy, environmental planning as well as careful future population projections. Only in this way creative strategies could bring long-term success for shrinking towns.

ACKNOWLEDGEMENTS

This paper is the result of the project 'The construction of student dormitories in Serbia at the beginning of the 21st century' (MPNTR - 36037), financed by the Ministry of Education, Science and Technological Development of the Republic of Serbia.

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PREFABRICATED HOUSING FOR INCREASING RESILIENCE TO FORCED MIGRATIONS

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ABSTRACT

The number of migrants has been increasing in the recent years. This trend will most likely be intensified in the future. Some predictions forecast a dramatic increase of migrations in the upcoming decades. This is mostly due to the expected climate changes that will affect the globe. Owing to climate causes it is anticipated that the number of forced migrants will considerably increase. Therefore, strategic planning in many aspects is necessary in order to increase the resilience to migrations. Housing a large number of displaced people is a huge challenge regardless of whether they are displaced internally or across the state borders. This paper investigates the benefits of using prefabricated buildings for housing units envisioned for displaced persons. At the beginning of the paper, forced migration is analysed. Then, general properties of prefabricated buildings are described. Finally, these features of prefabricated buildings are related to the needs of migrant housing. The results show that in several significant ways the characteristics of prefabricated buildings are suitable for application in housing of displaced persons.

Keywords: *prefabricated buildings; resilient cities; forced migrations; climate refugees; temporary housing*

1. INTRODUCTION

Migrations are a natural phenomenon that has always been present. Individuals and groups of people migrated throughout human history for various reasons. It is only when people started building settlements that the people flow became more evident. Previous research shows many aspects of the migration movement[2]. However, the migrations which will happen in the next few decades might be of an unprecedented scale and they may require strategic planning in order for their effects to be mitigated.

There are many ways to classify migrations. One of the most common is according to duration; hence daily, seasonal, life-long migrations or other categories are present. Another criterion is the relation between place of origin and destination of migration. According to this, internal migration is defined as a migration within the same country, as a contrast to cross-border migration. For the topic of this paper, forced migration as opposed to voluntary migration is studied as a possible cause of displacement of large numbers of people in short periods of time, with uncertain status and possibility to return to their houses. Labour migration as the most common form of voluntary migrations are not the focus of this paper; rather, forced migrations and their

1 Author research was carried out as part of the work No. WZ/WA-IA/2/2020 at the Białystok University of Technology and financed from a research subsidy provided by the Minister of Science and Higher Education.

2 Therefore, migrations are not necessarily a negative event, as most perceive it today. While in short term they might cause some problems, for example with integration, in long term there are usually positive, especially for the economy – R. King, A. Lulle, Research on Migration: Facing Realities and Maximising Opportunities, A Policy Review, EU, 2016. Also, macroeconomic evidence suggests that asylum seekers are not a 'burden' for Western European Countries – H. d'Albis, E. Boubtane, D. Coulibaly, Science Advances 20 Jun 2018:Vol. 4, no. 6.

causes are targeted and identified in this paper. By definition, forced migration is 'a migratory movement which, although the drivers can be diverse, involves force, compulsion, or coercion'[3]. More precisely it is described in a definition used by European Commission: forced migration - 'a migratory movement in which an element of coercion exists, including threats to life and livelihood, whether arising from natural or man-made causes […]'[4]. Since forced migrations may involve a massive relocation of people, the problem of housing inevitably arises. It may be alleviated or even solved through application of prefabricated buildings.

The prefabrication in building construction has been present in the architecture and urban planning discussions since the 1920s. It was connected to the housing design, as a response to the low standard of living in the 19th century city. A generation of architects discussed advantages and opportunities of prefabrication and promoted them in society, until prefabrication was put into practice in the 1930s. One of the protagonists was Walter Gropius, who realized that standardization and mass production shouldn't be concentrated on a building as a whole, but only on its elements (Gropius 1943). The situation in the world after the Second World War (general devastation of cities in Europe, Asia), difficult economic situation, and the generation of modernist visionaries called for the use of prefabrication on a massive scale all over the world. Although the 'fathers' of the modernism movement warned against the risks of prefabrication, nevertheless, the history showed that mistakes have been made.

Contemporary prefabrication is still used in the social housing in which the cost of construction is the most important issue. Since the beginning of the millennium the group of architects from Chile, with the well-known Pritzker award winner – Alejandro Aravena created a new system of investment and involved future inhabitants in the whole process (Aravena and Iacobelli 2020). Later, this system was also used in the reconstruction of housing buildings after an earthquake which destroyed the city Constitución in Chile in 2010. Aravena created an open system in which the inhabitants had the opportunity to add rooms to the dwelling and in such way accomplished two very important results: houses had the flexibility to adapt to the exact specific needs of each family, and the people's own resources and building capacity were involved in creating complete houses. During the design process, the architects focused on the things that inhabitants could not do individually, the things that are the most difficult, and the things that guarantee common good in the future. The prefabrication technology could provide excellent support to these established principles. Similar solutions could be used not just for social housing, but also in crisis situations, such as those created by forced migration. Further elaboration concerning forced migration is given in the following section. Characteristics of prefabrication technology are given in section 3 and its role in meeting the needs of forced migration is elaborated in section 4.

2. FORCED MIGRATION

Contrary to voluntary migrations, forced migrations usually happen in large numbers during shorter periods of time, and from more localized regions of the world. Since they are more concentrated, forced migrations are much harder to manage. Forced migrations are justifiably regarded as negative events, but what is often neglected is that the negative effects are not only the burden to be borne by the migrants, but also by the communities accepting them. 'Forced migration hinders development in at least four ways; by increasing pressure on urban infrastructure and services, by undermining economic growth, by increasing the risk of conflict and by leading to worse health, educational and social indicators among migrants themselves' (Brown 2008).

Causes for forced migration can be divided to those which are man-made or natural, although this division is not absolutely correct since man induces more and more changes to the environment, thus causing many indirect processes and chain-reactions. Another criterion for classifying causes for forced migration is whether they are happening suddenly or progressively. Finally, according to the effect they induce, these causes can be also divided into those that lead to temporary or to permanent migrations. Some of the most frequent causes for forced migration are briefly explained in the following paragraphs.

Wars are definitely among the worst events in human history. While the number of deaths by war is uncertain, it is definite that this number is enormous; likewise the number of migrants displaced because of war. War is a

3 Glossary on Migration, International Organization for Migration (IOM), 2019, p. 76. Source: https://publications.iom.int/system/files/pdf/iml_34_glossary.pdf [Accessed: 25 September 2020].

4 Definition of European Commission, Migration and Home Affairs. Source: https://ec.europa.eu/home-affairs/what-we-do/networks/european_migration_network/glossary_search/forced-migration_en [Accessed: 26 September 2020].

typical and the most obvious example of a man-made cause for forced migration. In most cases wars produce sudden and numerous forced migrations. Depending on the length of war there will be a difference in relation between temporary and permanent migrations. The longer the war the more likely it is that the migrations will become permanent, even though they are usually initially intended only as temporary. Wars were almost constantly waged throughout known history. However, after the Second World War, most of the world has been at peace for most of the time, the Balkan region being one of the unfortunate counterexamples.

Next, in the history of human civilization natural disasters are the most frequent and dramatic cause for forced migration. Today, unpredictable nature is still the main reason for the largest migration movements. Several most common types of natural disasters are floods, droughts, wild fires, hurricanes or tornados. All mentioned disasters are connected with the weather. They are sudden and predictable only to a certain level, while the areas of increased risk are also known. The need for temporary displacement of population mostly depends on the scale of the disaster. There is a possibility to prepare the crisis centres and rescue scenarios; nevertheless, the scale of the disaster and the resulting extent of the migration are hard to predict. In the second group there are disasters caused by seismic activity as earthquakes, tsunami waves, and volcanic eruptions. The 37% of global population is living in earthquake-prone areas (Pesaresi et al. 2017). Earthquakes in an ocean or a sea cause tsunami waves which could be a serious danger hundreds or thousands of kilometres from the source. One of the most tragic tsunamis was in 2004, when almost 300.000 persons perished and the coastal areas of the Indian Ocean, one of the most populated areas in the world, were destroyed creating an enormous number of refugees.

Anthropocene is postulated as a new geological epoch in Earth history. The geologists are still debating, unlike the climatologists who are confident that man is responsible for climate change. Climate change is predicted to be the main cause of increasing forced migration in the future. It is becoming harder and harder to differentiate which natural disasters are caused by the climate change. In addition, the factors connected with the human population, as overpopulation, famine, pressure on the natural areas increasing the possibility of diseases are necessary to be taken into consideration. While mankind expands in the world, affecting it by building cities and infrastructure, there is a higher risk of the destruction of human property.

At the beginning of the environmental movement specialists in the field of migration noticed a complex set of issues related to environmental disruption leading to forced migrations. Since 1980s there have been discussions about defining a new group of migrants, instead of the international law definitions created after the Second World War – climate refugee, environmental refugee, environmental migrant, environmentally/climate displaced person. E. El Hinnawi in 1980s even defined a new social group - 'those people who have been forced to leave their traditional habitat, temporarily or permanently, because of marked environmental disruption (natural and/or triggered by people) that jeopardized their existence and/or seriously affected the quality of their life' (Apap 2019).

Nowadays forced migration reaches around 79,5 million in all the world, while a decade ago it was 43,3 million (UNHCR, 2020). From that, 73% are hosted in neighbouring countries and 68% are from just five countries (Syria, Venezuela, Afghanistan, South Sudan, Myanmar). In the group of major destinations of asylum-seekers are six countries from Europe (with the Germany as the leading country) (UNHCR 2019).

The future situation is predicted to be more pessimistic, according to the Report of the International Intergovernmental Panel on Climate Change of the United Nations, which support governments with scientific data about the process of forced migration and future risks. Poverty and future migrations are one of the issues whose scale is difficult to predict, as the Report underlines. An inevitable fate awaits small island countries which will disappear in the next few decades. Consequently, 'multiple drivers and embedded social processes influence the magnitude and pattern of livelihoods and poverty, as well as the changing structure of communities related to migration, displacement and conflict' (Report IPCC 2018). The human climate niche which was stable since the last ice age could be significantly changed in the next 50 years. One third of the population will be living in the areas with mean annual temperature (MAT) >29°C, which now characterizes 0.8% of earth land surface, mostly in Sahara. These are countries with the weak economic conditions, which won't have resources for adaptation investments. In this scenario, without taking migration into consideration, areas with MAT>29°C (in 2070) will be inhabited by 3.5 billion people (Xu et al. 2020). Nowadays first displaced societies forced by climate change are noticed in Sahel region, where drought is almost permanent. Environmental migration is a fact. The situation in Europe will also change, the region of the Mediterranean Sea is at risk of desertification, and the ecosystems of Central Europe will be changed radically (Ionesco and

Mokhnacheva 2017). Environmental migration as a global process will also have a specific local character in Europe – mostly as local migrations.

To summarize, the scale of future migration movements will be unproportionally larger than nowadays. Both temporary and permanent migrations will be a consequence of natural disasters, and there will be an increase in the number of international refugee movements from countries struck by more drastic climate changes from southern regions of the globe. How to provide housing for millions of migrants will be one of the major challenges for societies. Since it will be the case of permanent forced migration movement, it is now time to prepare strategies and flexible, economic solutions for the mitigation of these events. Prefabrication technology may be a possible answer to the problem of systematically housing forced migrants in the future.

3. CHARACTERISTICS OF PREFABRICATION TECHNOLOGY

Prefabrication is not a modern invention. However, it has significantly gained popularity in the building sector in the second half of the 20th century. The idea of prefabrication, as opposed to in-situ construction, is to complete as much work as possible off-site, usually in specialized factories. Regarding different building materials, this process is most apparent in building with concrete. In this case, the difference between a) installing prefabricated structural elements on-site on one side, and b) mixing concrete, building scaffolding and formwork, preparing the reinforcement, pouring the concrete and curing it on the other side, is significant. For other structural materials such as steel, timber or masonry, some prefabrication is necessary, as these materials come to the building site in the form of prepared cross-sections or blocks. However, the level of preparedness of such elements can also vary. Generally, the greater the prefabrication level, the less work is left to do on the construction site; therefore, a greater prefabrication degree is considered to be better. Ideally, prefabricated elements would only have to be connected in order to get a complete building. In practice, there are usually additional tasks that need to be completed in order to finish the building. Basic overall advantages and disadvantages of prefabrication (Bachmann and Steinle 2011, Levitt 2008) are presented briefly in the following subsections.

3.1. Speed of Construction

One of the best and most favoured advantages of prefabrication is shortening of the construction time. When speaking about construction time in this case, only the time at the construction site is usually calculated, disregarding the time spent at the factories to produce prefabricated components of the system. However, even the speed of production in factory is faster compared to that at the site. There are several reasons for this:

- Workers, as well as structural elements and tools, are protected from negative weather conditions.
- Congestion, very typical for building sites, is avoided in factories.
- Production lines are well organized and equipped with all necessary equipment.
- Availability of tools not accessible at the construction site
- Reuse of formwork
- Safety measures are easier to comply with

It can be summarized that production conditions in factory can be controlled relatively easily and thus can be set to optimal levels.

3.2. Quality

Prefabricated elements presumably have a better quality of work compared to those constructed on site. This is a consequence of some of the reasons already listed for increasing the speed of construction. In addition to not being affected by the weather, structural elements are produced at optimal temperatures. There is the opportunity of using automated machinery for at least some parts of the production, which reduces the possibility of human error. The quality control of every single element is feasible. Possible mistakes are corrected instantly in the factory, without any impact on other elements of the structure. Logically, there is no guarantee that the quality of prefabricated elements will be better in all cases.

3.3. Installation

Installation of prefabricated building elements differs drastically to their construction on site. In several ways it can be regarded as a more advanced alternative. First of all, installation of prefabricated parts involves

more machine work, which is beneficial as it relieves people from heavy duty. Secondly, in most cases there is no need for constructing formwork, which saves a lot of time and human effort at the site. Finally, fewer people are involved in installation of prefabricated elements, thus reducing safety risks. In order to conduct efficient installation, good organization and management are necessary. In addition, adequate machinery needs to be hired and prefabricated elements need to be prepared for lifting and positioning, most commonly by adding special lifting anchors.

3.4. Transport

Transport is an important part of the construction process of prefabricated buildings. It is also one of its most notable disadvantages. Whereas in construction on site the raw materials are brought to site in bulk, which makes them easier to carry, prefabricated elements are more fragile, less compact and of fixed dimensions. Thus the transport of such elements is more complicated and more costly. In some cases, like with prefabricated units used for Habitat 67, the elements could be voluminous and difficult to transport together. In other cases, like with large girders, the elements are very long and thus special transport measures have to be taken. Prefabricated elements are usually not designed to be too wide or high, because then it might not be possible to transport them using the regular road network. Most prefabricated elements are possible to stack and transport using specialized vehicles. The issue of first transporting the raw materials to the factory and then transporting the prefabricated parts to the construction site in most cases makes the trajectory longer and thus also more expensive.

3.5. Storage

Optimized environment for production of prefabricated elements might produce a problem of another kind. While prefabrication factories are pushed toward using their maximum production capacity in order to increase their profits, installation of prefabricated parts as well as on site construction are dependent on the climate factors. This practically means that during certain periods, for example winter, there are more prefabricated elements produced than installed. Consequently, some elements need to be stored while waiting for installation. This problem can be facilitated by good organization, but it would most likely lead to factories working under maximum capacity during a certain period of time. Therefore, another issue is a choice between storage cost and losses due to reduced working capacity. Either way, some of the cost efficiency of prefabrication will be lost, and this is the downside that also needs to be taken into account when choosing prefabrication.

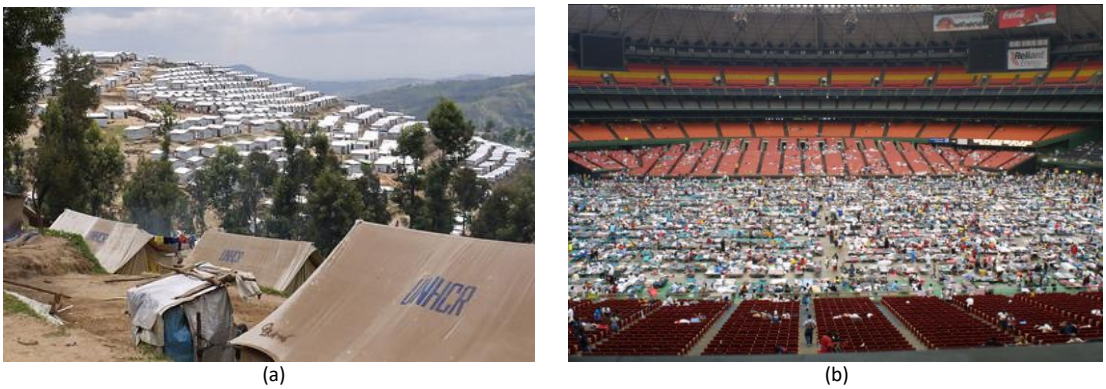
3.6. Cost efficiency

Many parameters influence the final cost of a prefabricated structure, some of which are mentioned in the previous paragraphs. However, one other decisive factor has to be pointed out in order to get a complete understanding of prefabricated buildings. The final cost of a prefabricated system may be reduced by reducing the number of different parts of the system, as well as by increasing the number of produced parts (PCI 1999). This is explained by fixed costs related to each different part of the system and also to the system as a whole. These fixed costs, not dependent on the number of produced parts, include costs like: structural analysis of the parts and the system, setting up or acquisition of the machines for production of new parts, training the workers for production of new parts, etc. Later on, the fixed costs are divided by the number of produced parts, which ultimately means that the total cost of a single element will be lower if there are more elements produced. This fact has led the investors to try to construct as many building with as few different parts in order to reduce the costs. Such a strategy was especially popular in east European countries in the decades after the Second World War. In the same region and period, construction of prefabricated buildings was often of low quality because of the same intention to reduce the cost. However, unification of buildings has led to monotonous neighbourhoods which, together with low quality, downgraded the general acceptance of prefabricated buildings. This example leads to the conclusion that the balance between the diversity of prefabricated parts and the attractiveness of the constructed buildings must be one of the priorities regarding prefabricated building.

4. THE ROLE OF PREFABRICATED HOUSING IN INCREASING RESILIENCE TO FORCED MIGRATION

Forced migrations are harder to manage when they are sudden and massive in quantity. When such forced migrations happen, the solutions for housing the migrants are usually below satisfactory standards. In most cases camps are set up in the fields away from urban areas, presented in the left side of Figure 1. A typical

housing unit in such camps is a simple tent which cannot provide indoor comfort as there is not much protection from outside temperatures. Level of hygiene present in camps can be far from sufficient. This is not the case only in developing countries. Recent examples from some of the richest countries in the world are similar. Right side of Figure 1 shows the example from the USA during the hurricane Katrina. Despite being safe from the disaster, thousands of people were jammed in a very limited space. Obviously, there are no possibilities for providing minimal privacy under such conditions. This example shows that even the most prosperous countries are not prepared for managing events of large and sudden migrations. Designing prefabricated housing for forced migrants would mitigate the consequences of such events. Whether they are used as temporary or permanent houses, prefabs can be an important step towards providing safer and cosier future for the migrants. Key connection elements between the phenomenon of prefabricated houses and the issue of housing of forced migrants are presented in the following paragraphs.



(a) (b)

Figure 1: (a) Around 14,000 refugees are sheltering in Kigeme camp in southern Rwanda, having fled a recent surge in violence in eastern DR Congo. The camp is spread across two hills with tents perched down the sides. This photo is taken from Site A (perched on a hill housing around 4,000 people) looking across to the larger Site B - now home to around 10,000 people living in tents, *https://www.flickr.com/photos/oxfameastafrica/8073663190/*, by Laura Eldon/Oxfam, License CC BY 2.0 and (b) Refugees in the Astrodome, USA, *https://www.flickr.com/photos/tiger_in_houston/40658491/,* License CC BY-NC-ND 2.0

Planning ahead is essential for successful response to forced migration. Similarly, it is also crucial for the prefabrication process. This is one of the core principles that connect managing housing problems of forced migration on the one hand and prefabrication on the other. Both of these processes need to be started months or years in advance. Strategic planning of housing migrants is one of the keys to increasing the resilience to migrations. National level plans need to be created in order to prepare adequate locations for housing migrants and estimate the capacity of such sites. On the other side, design of prefabricated housing units can be done much before the need for the first units arises. The production units can be also prepared and equipped accordingly, and can proceed with their usual work until the right time comes.

Second point of connection between forced migration and prefabrication is related to the speed at which events unfold. As mentioned earlier, forced migrations can be critical when they are sudden and massive. In such cases it is hard to provide adequate housing for all migrants momentarily. However, the best solution for this problem is using prefabrication, as it provides houses in the shortest possible period of time. The uncertainty of time and location of forced migration makes it uneconomical to build houses at specified locations in advance. Such houses might never be used if the location is not selected well. With prefabricated houses this problem can be overcame. The first option is to produce complete houses or modular parts of houses and store them. When time arises, they can be quickly transported to a required location and installed promptly. The whole operation can be conducted within hours, depending of multiple factors, such as the distance, means of transportation and available workforce. This solution is the fastest, but it accentuates the storage and transport as the negative sides of prefabrication. The cost of production of such houses in advance is not considered as a drawback, as they would have to be created eventually anyway. However, the problem of estimating the appropriate number of houses persists. The second option is to have the designs ready and production plants prepared, and start producing the prefabricated elements once the migrations start. This solution takes more time to be completed, and houses could be ready for use within days or weeks, depending mostly on the relation of the production capacity and the required number of houses. The benefit of this solution is that the number of produced houses matches the needs and any surpluses are avoided. In both cases the prefabricated houses can be designed as to be reused at different locations. This is a major advantage compared to building on site. It allows for such housing to be really used as temporary. Every future reuse would mean significant financial savings.

The next link between forced migration and prefabrication is related to the solution for large forced migrations. This time the accent is on a great number of migrants that need to be housed. In section 3.6 it is explained how increasing the number of produced prefabricated elements reduces the unit price of each element. Due to this, creating a large number of houses for a large number of forced migrants would actually bring the costs down, if prefabrication is used. This is an important benefit, since in times of crisis financial assets are always scarce and need to be carefully distributed between several categories.

4. CONCLUSION

An increase in the number of forced migrants in the future is considered to be inevitable. Regardless of the cause for such migrations, climate change being the most probable one, housing a large number of migrants will be a major challenge. Principally, this issue can be handled in different ways, depending mostly on whether the migrations are temporary or permanent. Mitigation of negative consequences of forced migration could be accomplished by planning ahead, and this research is part of such endeavours.

This paper investigates the concept of using prefabrication for producing housing for the migrants. Basic concepts and characteristics of prefabrication technology are presented in the paper. They are then linked to the features of the forced migration. The results show that prefabrication can offer solutions for some of the most important issues of housing forced migrants. In case that the preparation is done in time, the prefabricated houses can be erected very swiftly, thus responding to the sudden nature of forced migrations. The massive size of forced migration causes the reduction of prefabricated unit costs, thus making the connection between them more reasonable. Based on the presented analysis it can be concluded that prefabrication technology is very suitable for providing solutions for a safe and relatively comfortable housing of forced migrants.

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SMART GREEN PORT ASSESMENT ON PLANNING SOLUTION OF DOCKYARD IN BELGRADE

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ABSTRACT

Urban planning in Serbia is in dilemma on the paradigm and style of planning it should follow. There were plenty of opportunities taken and realized used top-down approach: eg. Belgrade waterfront, Urban regeneration of Belgrade Downtown, Infrastructural projects, etc. It seems that they achieved what was not possible over decades, however there is still lack of participation in crucial sense that will enable integration of all pillars of sustainability in urban planning and development. The paper will do a critique on existing planning solution for Dockyard in Belgrade taking into account Danube strategy and Sustainability paradigm as framework together with theory of Integrative urban space and green urbanism in relation to communicative theory of urban planning. The hypothesis is that top-down approach resulting in blue print planning can be starting point for wider participation towards smart solutions, in this case creating Smart port. Aims of the paper is to give guidelines for integration of top/down and bottom/up approach in Serbia exploring case of Plan of detail regulation for Dockyard in Belgrade, resulting in suggestions for its improvement towards "smart port".

Keywords: *urban planning, urban regeneration, sustainability, smart and green urbanism*

1. INTRODUCTION

We can say that urban planning is in major crisis on global level since global capital on one hand and democratic and identity movements together with protection of individual rights in regards to land ownership are rising since 1990s. We know that urban planning should give answer on what?, where? and how? Should be distributed in place, but the main question nowadays is why do we need planning? Since 19th century urban planning has a main role in protection of public good, especially related to working class, industrial zones, traffic and housing. The state was the actor who defined public good which is now under the discussion in regards to pluralism different interests and needs. So the answer to the question why do we need planning is to protect public good. But what is public good nowadays? It is not the same as it is before or it is somehow rearranged in regards to sustainability and globalization?

Town planning in Serbia went through different phases since 19th century over 1950s until today. The first urban regulation plan, done by Emilian Josimovic has the main aim to regulate settlement outside the Kalemegdan fortress and to enable further development of the Belgrade city according to clear planimetry, horizontal and vertical regulation main axes and quality of open and built spaces (image 1). Since then urban planning in Serbia was more or less regulated through large urban designs and competitions since 1950s when the first urban master plan for Belgrade was done aiming to provide social housing for working class who were migrating from countryside to cities in order to enable process of industrialization. This master plan was done instrumentally providing development and realization of complete new city on the other side of Sava river: New Belgrade, one of the largest projects in Europe and globe at the time.

This was possible because of social regime, absence of democracy, assumption and standardization of social class needs. So urban planning from 1950-1990s was regulated according to Maslov's hierarchy of needs that defined different classes in social regime: working and communist elite. The concept of Radiant city was forced in building New Belgrade, together with prefabrication, brutalism and strict standards. However, the need for housing was not in direct proportion to the state capital, who was the only actor at the market which actually did not existed because of singularity, therefore the human needs were defined bellow the Corbusier's standards, so housing were not at all close to his Unite. The process of planning was dedicated to urban planning institutes who were directly carrying out the state policy. In late 80s when Tito died, the state was not the only player at the "market" so large urban blue print plans were not able to satisfy citizen's needs, especially related to housing as well as to new players at the land market. In 1990s the new law on Urban planning and construction was adopted after decades of the old system which enabled flexibility and mixed use in land regulation, ie enabling functioning on quasi market at the time. Today, we can say that after collapse of SFR of Yugoslavia Serbia is somewhere in between top-down/instrumental planning, advocacy planning without real participation.

The reason why the New Belgrade was exposed in precious elaboration is that the Dockyard is on this side of the city. We can say that there are two intellectual movements in planning system in regards to this city: 1) Preservation and continuation of concept of Radiant city and 2) Redefinition of modernist urban morphology in order to provide new development, that are closer to contemporary needs and interest od citizens, public and private sector. The main question is how to integrate these two tendencies.

2. INTEGRATIVE APPROACH IN PLANNIG: CASE OF SERBIA

This chapter will discuss urban planning in line with different sectors and dimensions that should be integrated in sustainable development. In relation to socio-economic transition, process of urban planning should seek to bound different interests into coherent whole establishing an arena for Habermas's communicative action (Habermas, 1984). The discussion will be led by the thought that urban planning is multidimensional process can provide creative solutions for different developmental sectors of sustainable development: economy, society and environment, overcoming problems of rational and collaborative paradigm in urban decision making through communicative action.

Urban planning, seen as a communicative process it is strongly related to the traditions of urban decision making when it is more rational ("top-down") or collaborative ("bottom-up") process. The key factor in this dilemma is the type of rationality that is practiced in wider social context. Rational paradigm is based on objective rationality and positivistic approach to development. It means setting and evaluating all possible solutions and forming defined scope of action."It is based on instrumental rationality, namely on expert's analysis which enables setting of goals, identification of alternative courses of action, evaluation of the means by which the goals would be achieved and the creation of systems of implementation"(Dovey,1999).

In urban planning theory it is mostly supported with Faludi's model of planning agencies where they practice systematic and rational approach to urban development integrating different levels of governance into coordinated multi-planning system (Mrđenović,2013). The main critique to rational paradigm comes from Simon's rational constrains where it is not possible to generate and evaluate all possible alternatives because of constrains of human thinking. On the other hand, Lindblom in his theory of "muddling through" says that rational approach to development is not realistic in the real politics with complexity of different interests and stands for generating solutions in incremental approach (Linblom,1959).

Both systematic and incremental approaches have their positive and negative side. We can't for sure perceive reality in positivistic manner, and on the other hand if we lean on incremental approach we can be in situation without any developmental options. Healey in theory of collaborative planning sees urban development as putting fragments of viewpoints and interests into common picture through communicative process of bottom-up participation in different social arenas. She argues rational paradigm saying that it is not applicable in plural society and its complexity of different interests and thoughts.

Nowadays, sustainable development seeks to integrate the positive aspects of all paradigms creating glocal, integrative space. The space becomes as an arena for mediating differences in plural society. This integration means making linkages not only between the sectors of sustainability and different interests, but also linkages between different levels of governance, both horizontal and vertical. Therefore, we believe that sustainable urban planning is a process of creating glocal identities and places using integrative space as an instrument for developing Healey's "hard and soft" infrastructure or Giddens's "structures and agencies" (Giddens according

to Dovey, 1999). Here, we stand on Dovey's point that mediation in integrative space should be more "power to then power over" (Dovey,1999). In line with that, creating, developing, and maintaining integrative space becomes a main subject of sustainable regeneration. Thus, the question: How do we create, model, develop, and maintain the integrative space? The answer needs further elaboration on the model of integrative space.

By our opinion the model should provide glocal identities, spaces, and places that are in between CIAM and New Urbanism. Here, we lean on Castells's attitude that individuals and local and national identities are "frustrated" by the process of globalization. According to him they should create "project identity" based on memory, present moment, and dreams of the future. This identity makes them pro-active actors in the global community. Such actors are ready to develop new attributes with care and protection of traditional ones [9]. Only in that way the 'ratio' can be renewed on solid bases, integrating plural identities and values into a coherent whole: "I believe in rationality, and in possibility of calling upon reason […] I believe in the chances of meaningful social action, and transformative politics, without necessarily drifting toward the deadly rapids of absolute utopias." (Castels, 2004:4). We also believe in Baudrillard's objective space (Baudrillard, 2001) opposing the 'legality' of the mutual presence of relative rationalities that postmodern time favors. This 'new rationality' determines and supports a model of integrative space.

The model is challenged by conflicts among differences, as it should provide and develop the integrity of individuals, communities, and nations into a 'new rationality'. This rationality is more a hierarchical puzzle or dynamic, live-fractal than it is universal. On the other hand, we believe the barriers can challenge the development of the model. Our attitude introduces the main issues in designing the process, stated as follows: In which situations should the urban design process for regeneration be 'guided', 'mediated', or 'facilitated'? Should and can Landry's "creative milieu" overcome the obstacles in communication? Can it create preconditions for open communication, an argumentative approach, and Habermas's "communicative consensus"?

We believe that process of urban planning can create the preconditions for Habermas's "field of intersubjectivity" (Habermas, 1984), argumentative approach, and integrative space and place. However, we think that some conditions should be met before and during the process. Moreover, we stand with the position of Woolcock and Fukuyama that the process of emancipation should be iterative in developing human and social capital from bounding, linking, and partnership making (Woolckok & Deppa,1999; Fukuyama, 2001).

Those are the standards for the development of the model of integrative space. The creative milieu should make good spirit for change. Regarding the conditions, we would point out several criteria:

- The process should not start if there are big disparities among the stakeholders (NC);
- If there are big disparities, the programs of human capacity-building should be provided (NC);
- When disparities become smaller, the art and design can play a key role in integration (SC 1,2);
- Urban planners should not design the process alone (NC);
- The process should be designed by an interdisciplinary team, but urban planners can play a crucial role in designing it (NC) (See Figure 1).

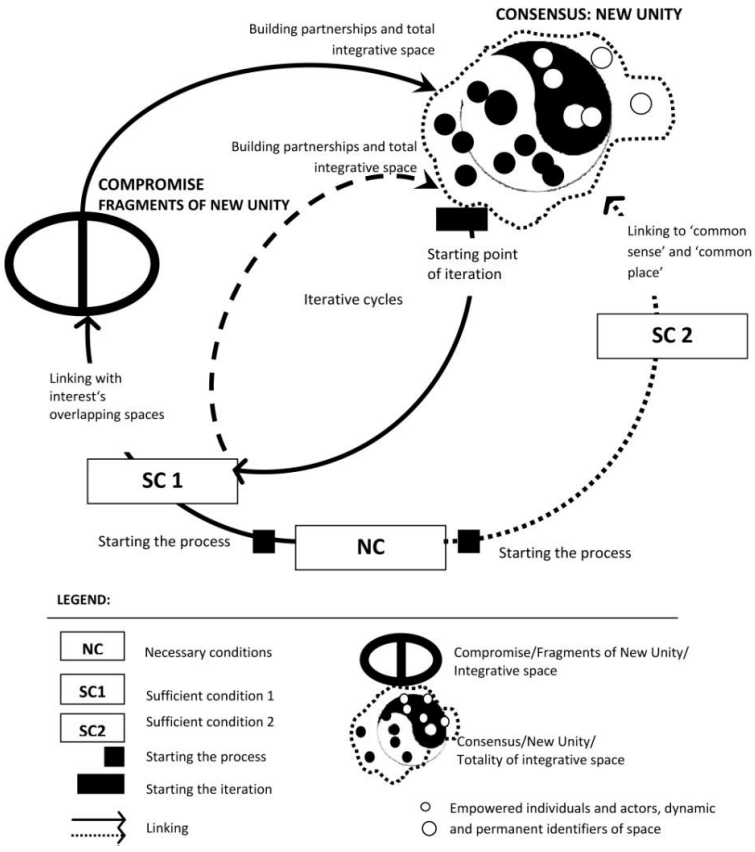

Figure 1: The model of creating integrative space

Integrated planning in Serbia is according to present legislative related to horizontal and vertical integration of present planning system, meaning that arrangements from upper planning level should be incorporated into plans on lower level. According to present Planning and construction law for urban areas there are several planning instruments that should protect public good and enable activation of urban lots and their development: 1) Master plan, 2) Plan of general regulation, 3) Plan of Detail regulation, 4) Plan of lot rearrangement, 5) Urban design project. These urban planning instruments are hierarchical and in that manner integrated (RS, 2018). However, present Low on planning and construction does not give guidance for methodological approaches even though it is mentioned that concept of sustainability, ecology, equity should be respected, but it is not defined how.

The previous theoretical discussion clearly shows that integrated planning has a wider meaning in relation to creation a space for communicative consensus on what is common meaning and common interest or common public good for a particular urban area or lot enabling participation of all relevant stakeholders that come from public, private and civil sector.

3. DISCUSSION ON PLANNING SOLUTION OF DOCKYARD IN BELGRADE

This chapter will discuss planning solution od PDR for Belgrade's dockyard on Sava river in regards to theoretical conclusions and guidelines from wide EU macro regional strategies for Danube region.

3.1 Overview on main principles and aims of Danube macro regional strategy

EU macro regional strategy for Danube region defines several developmental pillars: A) Connecting the Danube region; B) Protecting the environment in Danube region; C) Building prosperity in Danube region; D) Strengthening the Danube region. Each pillar has its specific areas for action plans: A) 1) to improve mobility and multimodality, 2) To encourage more sustainable energy, 3) To promote culture and tourism, people to people contacts; B) 4) To restore and maintain the quality of waters, 5) To manage environmental risks, 6) To preserve biodiversity, landscapes and the quality of air and soils; C) 7) To develop the Knowledge Society through research, education and information technologies, 8) To support the competitiveness of enterprises, including cluster development, 9) To invest in people and skills; D) 7) To develop the Knowledge Society

through research, education and information technologies, 8) To support the competitiveness of enterprises, including cluster development, 9) To invest in people and skills (EU, 2010)

According to these priorities and aims we can say that overall vision for Belgrade's dockyard can be defined as:

"SMART PORT – DOCKYARD OF CULTURE in the Danube region. Urban regeneration of Belgrade's dockyard in multimodal transport node, through activation of industrial heritage for cultural purposes, improvement of environment and creating specific meeting places for trade and commerce, bound by traditions, energy efficiency and socio-economic prosperity."

3.2 Overview on the plan solution and its relation to main principles of Danube strategy

The Plan for Detail regulation for Belgrade's dockyard is lining on the instruction from Master plan for Belgrade which defines the area as commercial, housing and public services (spot facilities and transport) in line with morphological schemes from its surrounding. The other documents that are according to PDR and Law on planning and construction relevant for this zone are: Plan for general regulation and Plan for distribution of floating objects along Sava river as well as Plan for Ring road. The plan does not even mention EU Danube strategy.

The plan regulates the industrial zone through urban regeneration into commercial, housing, sports, public, transport and green zones in a way that it respects morphological postulates of its surrounding. The energy supply is regulated through traditional electro energy system of heating stations using traditional energy sources like gas or coal. It does not even mention the possibility of regulating high water through mini hydropower stations or using plants and alga for producing electricity through research and innovation. Existing IT college is not recognized as potential that should be developed into IT technological park or smth. Similar which could transform existing area into smart port through innovation-technology center for sustainable development of the port and its surrounding. The transport system is regulated traditionally through hard measures – building new roads, pedestrian and cycling routes, however the Mobility center for managing transport system is not even mentioned even though the area is on the main point to be new, strong mobility node in Belgrade, Serbia and wider region, connecting Croatia, with Black sea as well as two sides of Belgrade city with the globe through highways, train and airport.

Furthermore, the plan does note provide mixed use framework for development, delivering blue print zones for distributing of activities, so we can say that it is not market oriented as land has no opportunity costs as the basis for its value. (Image 2) The ratio of distribution of housing and commercial activities is app. 50:50 with medium percentage of land consumption. Also, the distribution of activities is more based on traditional, Maslov's theory of needs where housing is in front area of the aquatorium and commercial activities are in the "backyard". We can say that this plan, even though it should regulate interests on micro locational level is everything but "not in my backyard". On contrary it seems that it is based on social system of planning where Detail urban plans were norming public good. Therefore, we can say that even though the aims of the plan seem promising they are resulting in blue printed, not communicated and negotiated solution where public good was put instrumentally not incrementally through consensus. What is more it does not even mention the inputs from EU Danube strategy in which area the port is. There is no clear vision of the image of future port, so the aims are more sectorial just providing connection with existing other sectorial laws on water, environment, security. We can say that plan answered only partially to the one of pillars of Danube strategy: Protecting the environment.

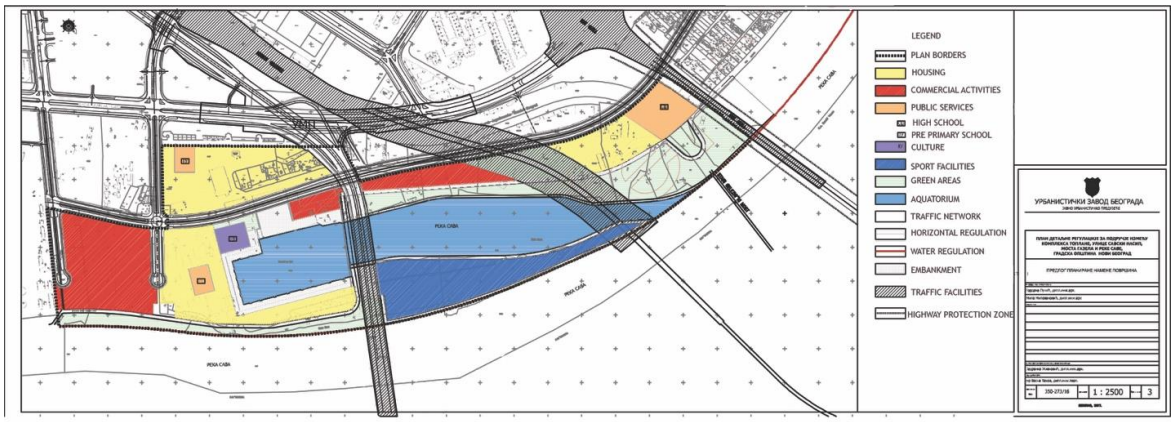

Figure 2: Proposal of activities distribution (MU of New Belgrade, 2017)

We can not say that Building prosperity can not be done with 50:50% of share between traditional housing and commercial activities without technological parks, Tourism development, Innovation center for exploring water systems, etc., Accommodation facilities, new landing stages, etc. Also, Connectivity in the Danube region can not be accomplished without Mobility center that will regulate flow of people and goods. Also, there is no clear regulation of connecting different people in the port through cultural activities as tourism is not even mentioned in the plan even though there are regulated cultural structures but there are plenty of them in Belgrade, especially in New Belgrade. Further more the port is not treated as a place for cruisers, yachts and other floating structures with its accommodating facilities especially for tourists.

Also, trade as one of the most important economy branches is regulated through commercial activities, not mentioning possibility or regulating trade market of goods from the region which would open possibility for the port to be Regional trade center for specific goods that should be negotiated through stakeholders and provide connectivity of people in wider region building prosperity through innovation. In line with this plan estimates 6.100 employees in commercial sector that is calculated according to new built area, not according to real investments and prosperity. Sports activities are not connected or related to tourism, exploring nature, practicing traditional ways of living, etc , so we can say that none of the proposed activities are not related to some of developmental branches like: IT industry, Trade and Innovation centers, Technological parks, Tourism, Alternative energy, new ways of living with water not on the water etc.

The rules for building of the future structures are defined according to the surrounding urban tissue which is regulated according to radiant city without upgrading the morphological arrangements to more global needs and standards without mentioning iconic architecture and forms, its possible distribution according to visors, etc. We can say that in regards to morphological solutions the plan offers structures that are more for housing near water on the site that is not of high importance in regards to its position, traffic potentialities for economic and blue growth, etc. The main contradiction with this concept is that maximum building levels for housing is 6 and for commercial 12 levels that is far more beyond surrounding structures. We can say that plan underestimate the importance of the area especially related to commercial structures, its distribution and percentage of share in other activities.

4. CONCLUSIONS - GUIDELINES FOR IMPROVEMENTS OF PDR FOR BELGRADE'S DOCKYARD ON SAVA RIVER

The research showed that the planning system in Serbia is nowadays still on the central level with non-transparent process of participation of all relevant stakeholders, meaning that some of them are regulated within planning procedure, however the others are not involved or not recognized as relevant. The Law on planning and construction obliges governments to the low level of participation: consultation through public seeing it is still not the model that is coherent with global society, sustainability and dynamic development. However, most of the relevant projects has been done through this kind of planning: Belgrade's waterfront, Reconstruction of inner city of Belgrade, major segments of infrastructure, but they are not either on the side of modern "Radiant" city nor "Futuristic". We can say that the system of planning is using old model for new kind of modern hybrid society.

The case of Plan of Detail regulation for Belgrade's dockyard showed that the planning process, and solution did not go through full participation process, therefore public good is defined according to normative needs not

through communicative consensus for creating integrative space (See Figure 1). The dockyard is treated as just one of the brownfield, neglecting its spatial and policy position. Most of the potentialities are neglected, especially environmental ones. The major pillars of EU Danube strategy are not reached. Even though the aims of the plan are promising it is not clear how they are reached though distribution of activities in space and the building rules.

The most important activities for Strengthening the region, Connectivity and Blue growth are missing like Mobility canters, Technological parks, Innovation centers, Alternative water energy sources, trade centers for connecting the region an its products, Tourism development, Green infrastructure, green architecture. It is not clear for whom this plan is done: who will live here, who will do trade here, etc. Therefore, the other level of planning and creating integrative space is missing: Branding towards multicultural society.

We can conclude that this kind of solution could be anywhere and everywhere. The site specificity including the involvement of specific stakeholders from public, private and civil sector is missing, so the criteria for generating integrative, sustainable place were not followed fully, we can say that only fourth and fifth were respected which means that the plan is more on the side power over that power to (See Figure 1).

On the other hand, most of the pillar and actions proposed by EU strategy for Danube region were not taken into account so the plan propose environmental activities that are in the area of managing environmental risks but not being friendly with environment, resilient and open for diversity. The future dockyard is not smart in branding, in technological aspect, in mixing activities, in capacity building, in smart usage of natural and cultural environment. So, we can conclude that this plan should be revised taking into account everything that is mentioned above, including international competition for this site.

Proposed activities for improvement of the future port are:

Multimodal logistics center: water traffic - rail - air traffic; Hydrological water management system for energy and Purification; ICT center for traffic management, waters, activities, facilities and surfaces in port for sustainability; Formation of hiking, cycling trails and other multimodal infrastructure

GAS depot: Sustainable energy station; Mini-hydro centrals; Solar station; Algaes; Windmills

Tourism and cultural center: Independent entertainment and recreation centers; Developmental - research center; Different forms of accommodation capacities; Integrative recreational spaces; Theme parks; Tourist information points; Wellness centers; High water protecting system; Green housing;

Green housing and technology: New flora and fauna Habitats; Ecological bridges; Ecological sleeping walls**;** Educational-development research center; Electronic services; Establishing a regional business center; Technological parks for the improvement of food products; To establish a metropolitan cultural center; Forum center for dialogue and participation.

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FUNCTIONAL AND AMBIENT QUALITIES OF SCHOOL GROUNDS: A CASE STUDY IN NIS

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ABSTRACT

The paper discusses the functional and ambiental qualities of school grounds. In addition to the school building, special attention is paid to the key spatial units of the school grounds, namely outdoor classrooms, schoolyard, sports fields, school garden and green areas.

The conducted survey of the existing school fund included all 20 elementary schools in the city area of Nis. The main goal is to identify key functional and ambiental shortcomings in the existing concepts of school grounds, the improvement of which, in the next phase, would contribute not only to the formation of an adequate environment for education but also to the urban landscape. The results of the study indicate a number of recorded functional and ambiental deficiencies on the processed sample of existing school grounds.

Keywords: *school grounds, school building, function, open space*

1. INTRODUCTION

The modern urban design of elementary schools completely exceeds the former needs for building the school building itself. The current role of the elementary school strives to realize modern systems of educational activities both in the school building and through certain contents in the open space, ie in school grounds.

The process of critical re-examination of the existing concepts of school grounds is based on the need for their spatial and temporal framework to ensure the acceptance of modern pedagogical movements, in order to enable various functions for use today, while possessing vitality for future changes. It can be said that the existing fund of school grounds represents a spatial-temporal expression of a certain, in the broadest possible sense, social structure and its changes. As a result of such changes, a certain qualitative level of urban structure is established, the evaluation of which requires consideration of a number of different influences that have determined it over time.

In addition, the importance of the organization of elementary schools and school grounds in the structure of the city is expressed through the fact that it precedes the process of architectural organization of elementary schools. The functional and ambient value of elementary schools at the level of microlocation, ie within school grounds, gravitational areas of housing units and other elementary urban functions, is one of the important parameters in the valorization of the urban landscape.

For a more complete approach to understanding the issue of functional and ambient qualities of elementary schools and school grounds, special attention is paid, in addition to the school building, to key spatial units of school grounds, namely outdoor classrooms, schoolyards, sports fields, school garden and green areas.

The goal is, therefore, to identify key functional and ambiental shortcomings in the existing concepts of school grounds, the improvement of which, in the next phase, would contribute to the formation of not only an adequate environment for education but also to the urban landscape.

2. THE STUDY FRAMEWORK

In an effort to review the functional qualities of the existing school grounds of elementary schools, a survey of the existing school fund was conducted. The recorded state of the school fund included all 20 elementary schools in the city area of Nis.

The analysis of the functional organization and content of school grounds aims to obtain indicators on the basis of which it is possible to observe the value of existing concepts, the ambiental quality of the available space and its functionality.

The study framework is based on a synthesis of the results of previous research by the authors of this paper, but also on no less important and relevant studies by other authors who have established a strong link between theory and practice in this area. The first, and due to the methodological approach to the problem which is examined, a more important level of analysis involves recording deficiencies in the content and organization of existing school grounds. The second stage of the analysis of the existing school grounds is directed towards the key aspects that conditioned the formation of the school building. In doing so, both aspects imply functional and ambiental qualities.

Table 1: Elementary schools in the city area of Nis - general data

	№	Elementary school	Street	Year of construction	Year of upgrade	Development (class coverage)	Number of shifts
EXISTING FUND OF ELEMENTARY SCHOOLS IN THE CITY AREA OF NIŠ	**01**	"Vožd Karađorđe"	Voždova 29	1889	1937	I - VIII	2
	02	"Radoje Domanović"	Generala Milojka Lešjanina 49 a	1932	1960 1978	I - VIII	2
	03	"Kralj Petar I"	Vojvode Putnika 1	1933	----	I - VIII	2
	04	"Učitelj Tasa"	Rajićeva 24	1935	----	I - VIII	2
	05	"Njegoš"	Ratka Pavlovića 60	1955	1973	I - VIII	2
	06	"Ratko Vukićević"	Ratka Vukićevića 5	1958	1968	I - VIII	2
	07	"Čegar"	Školska bb	1959	1971	I - VIII	2
	08	"Vuk Karadžić"	Beogradska 2	1960	----	I - VIII	2
	09	"Car Konstantin"	Velikotrnavska 4	1962	1976	I - VIII	2
	10	"Dositej Obradović"	Kraljevića Marka 13 a	1962	etapno	I - VIII	2
	11	"Branko Miljković"	Ljubomira Nikolića 3	1965	1972	I - VIII	2
	12	"Ćele Kula"	Radnih brigada 28	1966	1975, 1976	I - VIII	1
	13	"Bubanjski heroji"	Bubanjski heroji 1	1972	----	I - VIII	2
	14	"Stefan Nemanja"	Kosovke devojke bb	1973	----	I – VIII	2
	15	"Ivo Andrić"	Branka Bjegovića bb	1974	----	I – VIII	2
	16	"Kole Rašić"	Vase Čarapića 8	1977	etapno	I – VIII	2
	17	"Sveti Sava"	Garsije Lorke bb	1980	etapno	I – VIII	2
	18	"Sreten Mladenović"	Šabačka 20	1982	1989, 1998	I – VIII	2
	19	"Dušan Radović"	Đerdapska 45	1987	2004	I – VIII	2
	20	"Miroslav Antić"	Knjaževačka 156	1983	2006	I - VIII	2

Figure 1: Elementary schools in the city area of Nis

3. CONTENT AND ORGANIZATION OF EXISTING SCHOOL GROUNDS

Insight into the current state of school grounds in Nis indicates a very poor offer of outdoor content. In addition to the school building, the content of school grounds in Nis consists of access communications in which elements of schoolyard, open areas for physical education, earth surfaces or green areas are partially recognized, which are insufficiently designed in the ambiental sense.

The existing scope of outdoor facilities can largely satisfy the needs of school-age children for play and sports, as well as for refreshments and rest. However, due to the relatively low functional and purposeful diversity of the presented content in the open space, there are obvious shortcomings in terms of developing and shaping pedagogical activities.

Therefore, due to the lack of outdoor classrooms, school gardens, clearly defined and well-designed schoolyard areas (younger - older age students), the absence of ambient spaces for gathering and various activities of students in the form of amphitheater plateaus and other facilities in the natural environment, it is not possible to realize the efforts of modern pedagogical theory and practice so that a large part of the students' activities are realized through various, both in terms of function and purpose, contents in the open space.

Apart from the fact that, at the time of the school grounds construction, the role and importance of functions of the open space were not fully recognized, an additional, aggravating circumstance is the possibility of interventions which would contribute to a more meaningful arrangement of open spaces. The possibility to transform school grounds is greatly hampered by the existing shape and available size of individual plots.

As many as six school grounds ("Ratko Vukićević", "Dositej Obradović", "Ćele Kula", "Bubanjski heroji", "Stefan Nemanja" and "Ivo Andrić") have a very irregular shape of the plot, which adversely affects every type of functional organization, existing or potentially introduced new contents.

Based on the previously established criteria, it is not possible to single out school grounds of adequate spatial conception. Namely, in addition to the mentioned shortcomings in the scope of the existing contents, there are several important characteristics which stand out in terms of their organization.

Having in mind the developmental level of elementary schools, spatially and ambientally improvised schoolyards are generally not differentiated into zones of younger and older students.

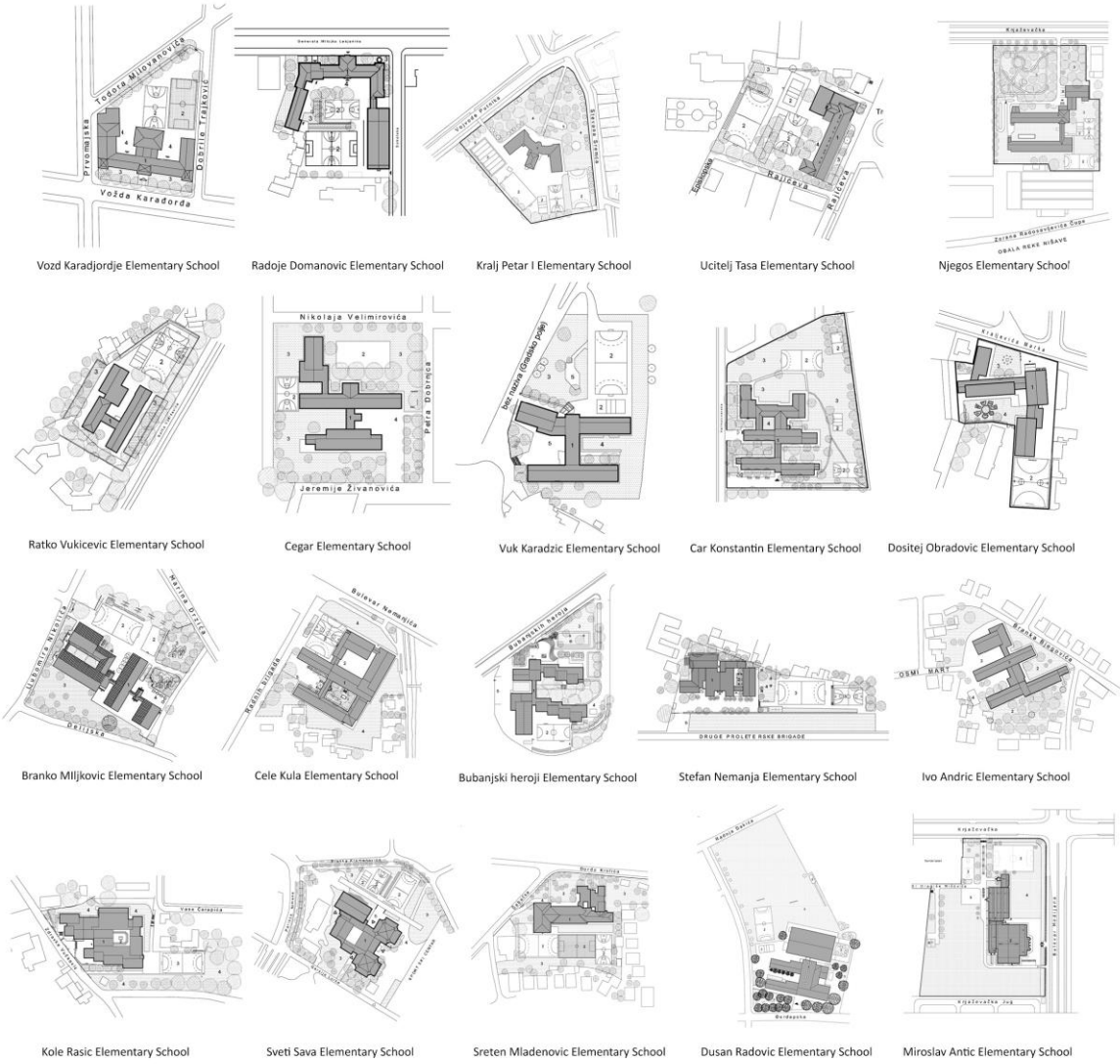

Figure 1: School grounds in the city area of Nis

Sports fields, to a greater or lesser extent, exist in every school complex. However, a number of irregularities are noticed at the level of the organization. They refer to the size and content of the training ground, in other cases to the position of the training ground in the complex, as well as to the absence of grassy terrains and a protective belt of greenery. Also, in several situations ("Radoje Domanović", "Čegar", "Car Konstantin", "Branko Miljković", "Bubanjski heroji", "Kole Rašić", "Sreten Mladenović" and "Miroslav Antić"), the incorrect orientation of sports fields is noticeable.

In the absence of built sports areas, the last few years have been characterized by the introduction of the so-called a “balloon” gyms. Although this approach in financial terms, especially in our conditions, solves in a way the problem of sports facilities deficiency, the spatial dislocation of the „balloon“ hall itself in relation to the elementary school building, as well as the aesthetic component of such interventions, remains debatable.

Green areas are also present to varying degrees. With their presence in most school grounds, we can say that these contents are at a relatively satisfactory level, however, without clearly defined contents in the

function of certain pedagogical activities. For its treatment of green areas, elementary school "Kralj Petar I" should be mentioned. It has maintained a high level of natural attractiveness and microclimatic conditions in a fairly properly developed zone of access communication.

Table 2: Content of open areas in school grounds

	ELEMENTARY SCHOOL	Summer classrooms	Schoolyard	Sports fields	School garden	Green areas	Economic yard
EXISTING FUND OF ELEMENTARY SCHOOLS IN THE CITY AREA OF NIŠ	"Vožd Karađorđe"	□	◘	◘	□	◘	□
	"Radoje Domanović"	□	◘	◘	□	◘	◘
	"Kralj Petar I"	□	◘	◘	□	■	◘
	"Učitelj Tasa"	□	◘	◘	□	◘	□
	"Njegoš"	□	◘	◘	□	■	◘
	"Ratko Vukićević"	□	◘	◘	□	◘	◘
	"Čegar"	□	◘	◘	□	■	□
	"Vuk Karadžić"	□	◘	◘	□	■	□
	"Car Konstantin"	□	◘	◘	□	■	◘
	"Dositej Obradović"	□	◘	◘	□	◘	□
	"Branko Miljković"	□	■	◘	□	■	◘
	"Ćele Kula"	□	◘	◘	□	◘	◘
	"Bubanjski heroji"	□	◘	◘	□	■	◘
	"Stefan Nemanja"	□	◘	◘	□	■	□
	"Ivo Andrić"	□	◘	□	□	■	◘
	"Kole Rašić"	□	◘	◘	□	◘	◘
	"Sveti Sava"	□	◘	◘	□	■	◘
	"Sreten Mladenović "	□	◘	◘	□	■	◘
	"Dušan Radović"	□	◘	◘	□	■	◘
	"Miroslav Antić"	□	◘	◘	□	■	◘

■ REPRESENTED ◘ PARTIALLY REPRESENTED □ NOT REPRESENTED

Table 3: Characteristic parameters of Elementary schools in the city area of Nis

	ELEMENTARY SCHOOL	Area under the building (m^2)	Open area (m^2)	Complex area (m^2)	Required area of the complex (25 m^2/st.)
EXISTING FUND OF ELEMENTARY SCHOOLS IN THE CITY AREA OF NIŠ	"Vožd Karađorđe"	1630	3560	5190	9725
	"Radoje Domanović"	2116	5152	7268	12450
	"Kralj Petar I"	1050	12400	13450	11825
	"Učitelj Tasa"	1108	5592	6700	11950
	"Njegoš"	2070	15390	17460	7875
	"Ratko Vukićević"	1370	5320	6690	11325
	"Čegar"	2192	9352	11544	10525
	"Vuk Karadžić"	1664	9552	11216	5925
	"Car Konstantin"	3545	15901	19446	10325
	"Dositej Obradović"	1436	2974	4410	8175
	"Branko Miljković"	2556	8649	11205	15700
	"Ćele Kula"	3184	5942	9126	9050
	"Bubanjski heroji"	1431	7353	8784	11700
	"Stefan Nemanja"	1920	5186	7106	13950
	"Ivo Andrić"	2104	6241	8345	12900
	"Kole Rašić"	2170	3060	5230	10100
	"Sveti Sava"	4250	27300	23050	12950
	"Sreten Mladenović "	1715	7471	9186	5150
	"Dušan Radović"	2391+1775	19442	23608	16425
	"Miroslav Antić"	1496+2425	26859	30780	15375

Most elementary school complexes are in dramatic contrast to modern pedagogical requirements. With very few exceptions, it can be concluded that the overall level of organizational and environmental values in Nis school grounds is far below acceptable minimums.

4. ASPECTS OF SCHOOL BUILDING FORMATION

From the aspect of the architectural organization of elementary schools, the importance of the analysis of existing school grounds is multiple. Among other things, it is reflected in the identification of those factors and parameters that have largely influenced the formation and overall functionality of the architectural plan of the elementary school, its transparency and openness to future changes.

Having in mind the group of elementary factors such as natural conditions, immediate environment, program content, as well as the size and shape of the observed locations, we can single out their impact in regard to:

- developed form of architectural plan,
- relation of the school building to open areas,
- position of elementary schools towards the physical environment of school grounds,
- innovation possibilities

4.1. Form of architectural plan

Disparate forms of the architectural plan are dominant in all elementary schools, at the same time the need for their harmonization with the reference directions which arise from the shape of the location is not recognized.

Apart from the elementary school "St. Sava", the fact is that the existing school dimensions formed in this way are not the result of specific pedagogical requirements. Their formation was mostly conditioned by the commitment of the designers towards the typical architectural pattern of a traditional school, while respecting the requirements related to the orientation of classrooms.

Due to the incorrectly dimensioned areas of the locations, some school buildings, with their disparate dimensions, have occupied the space of the school complex to the extent that it is not possible to adequately organize the contents in the open space.

4.2. The relationship of the school building to open areas

In the case of the observed school grounds in Nis, the relationship of the school building to the open areas is characterized by monofunctionality and introversion. The uniform spatial matrix of most school grounds is defined by the model access road - school building - open areas for physical education. Other surfaces surrounding these three elements are not clearly defined by function and purpose. In some locations, these are earthen areas, then symbolically arranged zones of greenery or overcrowded concrete plateaus that negatively affect the microclimatic balance of the complex.

The present uniformity of open areas according to the function and purpose makes school grounds unsuitable for the organization of a wider range of modern teaching and extracurricular activities of students. If we exclude open areas intended for physical education, it can be said that the school building is the only possible place for adequate organization of educational process. Therefore, the existing possibilities for a wider extension of pedagogical activities from the school building into the open space area are minimal.

4.3. Position of elementary schools according to the physical environment

In 60% of Nis schools, shortcomings are expressed regarding the position and relationship of the school building towards the school grounds.

Without adequate protection of classrooms from potential public traffic noise, seven school buildings ("Vožd Karađorđe", "Radoje Domanović", "Učitelj Tasa", "Ratko Vukićević", "Vuk Karadžić", "Kole Rašić", "Dušan

Radović") are positiond directly on busy roads or are at a distance that is below the acceptable minimum. In the case of the elementary school "Vožd Karađorđe", such a situation is somewhat justified, having in mind the norms at the time when the building received its final architectural form through construction and subsequent adaptations.

Optimal withdrawal of the school building from the surrounding roads is present in several schools ("Njegos", "Bubanjski heroji", "Miroslav Antic"), unfortunately, in some situations without a formed protective belt of high greenery towards the street.

Also, there are situations in which the neighboring residential family buildings and their yards penetrate the school grounds, violating the functionality not only of the school grounds, but also the functionality of the school buildings themselves ("Ratko Vukićević", "Dositej Obradović", "Ćele Kula", "Stefan Nemanja", "Ivo Andrić", "Kole Rašić", "Sreten Mladenović"). The distance of these school buildings from some surrounding buildings is below the required minimum.

5. CONCLUSION

The conducted study indicates a number of recorded functional and ambiental deficiencies on the processed sample of existing school grounds. During the planning and formation of school grounds, the role and importance of outdoor functions were not fully recognized.

Besides the school building, the content of the school grounds in Nis consists of access communications in which elements of the school yard are partially recognized, then modest open areas for physical education and earthen areas or green areas that are insufficiently designed in the ambiental sense.

The existing scope of outdoor failities can mainly satisfy the needs of school-age children for play and sports, as well as for refreshments and rest. However, due to the relatively low functional and purposeful diversity of the presented contents in the open space, there are obvious shortcomings in terms of developing and shaping pedagogical activities.

Lack of outdoor classrooms, school gardens, clearly defined and well-designed schoolyard areas (younger - older age of students), the lack of ambient spaces for gatherings and various activities of students in the form of amphitheater plateaus and other facilities in the natural environment, make it impossible to fully realize modern pedagogical theories and practices in which a large part of students' activities should be realized through various, both in function and purpose, contents in the open space.

It can be concluded that the school building is the only possible place for adequate organization of educational process. The existing possibilities for a wider extension of pedagogical activities from the school building into the open space are minimal. Also, the overall ambiental qualities of the observed outdoor spaces, both in cooperation with the school building and in relation to the environment, are not adequate.

The existing dislocation of the school network, but also the partial absence of an appropriate strategy in the current legal framework affects a very large number of inadequate organizational forms of existing elementary schools and school grounds in urban areas. The current urban-architectural theory and practice basically treats this problem partially. To a large extent, urban planning of housing units is done accordiing to the organization of elementary schools, while the existing normative matter for the design and construction of elementary schools provides the framework of organizational recommendations in regard to the level of development and capacity, choice, size and structure of school grounds.

Inadequate planning projections of future development of urban areas and future changes that may occur in the demographic disposition of the population, discontinuity in remodeling the existing school fund and its planned harmonization with newly designed school networks result in excessive capacity of elementary schools, and thus conditionality of multi-shift organization. Gradually relieving the capacity of existing elementary schools, by remodeling the school network through the interpolation of new school grounds, is a way to make functional and environmental improvements.

In order to shape not only an adequate environment for education but also the urban landscape, in the next phase of consideration it is necessary to define measures for improving the recorded key functional and environmental deficiencies of the existing school grounds.

Certainly, the specificity of a elementary school and diversity of its functions require that the level of improvement, in addition to the school building, be rounded off with an innovated spatial concept of the location itself. This type of spatial organization implies a clear separation, by function, of different spatial units of the school, as well as their harmonious functional and ambient connection in the form of a unique structure of school grounds.

ACKNOWLEDGEMENTS

The paper is a part of the research done within the project "Revitalization of preschool facilities in Serbia – The program and methods of environmental, functional, and energy efficiency improvement" (TR 036045), funded by the Ministry of Education and Science, Republic of Serbia.

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ICUP2020
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PLANNING, SCALE OF OWNERSHIP AND THE OPTIMAL NUMBER OF CO-OWNERS

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ABSTRACT

During the first two decades of the transition from a centralized socialist to a democratic market society, the most significant change in urban development in Bulgaria was the transformation in the ownership structure of urbanized land - the bulk of the land was transformed from state/public to private. Private interests began to dominate urban development. Urbanists see their own role mainly in protecting the public interest and are therefore critical of private interests. They generally consider private property as causing deterioration of the urban environment. A relevant example is the environmental deterioration in Bulgarian seaside resorts. Simultaneously, most Bulgarian urban planners acknowledge the radically different result from land privatization in the resorts of Sunny Beach, Golden Sands and Albena. Why does private property function so differently in these three resorts? This question may seem easy to answer, but it is fundamental to planning practice.

The goal of this article is to provide a more in-depth answer to the question about the role of private property with respect to its role for different urban functions. The proposed answer is based on the understanding that property is not a simple institution (purely private or purely public), but a complex structure containing both common and private components. The article is based on the understanding of the institutional nature of property rights. It draws on recent research and James Buchanan's theory of the optimal number of co-owners.

Keywords: *private ownership; common ownership; sustainability; optimal number of co-owners; property rights theory, institutional theory*

1. INTRODUCTION

During the first two decades of the transition from a centralized socialist to a democratic market society, the most significant change in urban development in Bulgaria was the transformation in the ownership structure of urbanized land - the bulk of the land was transformed from state/public to private. Political and economic changes give impetus to private initiative and the pace of urban development accelerated. Despite the crisis of the transition, virtually all large cities in Bulgaria experienced a construction boom yet before the end of the century. (Nikolov, 2016; Slaev & Nedović-Budić, 2017; Slaev et al., 2018). Soon after that - at the beginning of the new century, a second construction boom followed, most intensive in the recreational and tourism areas. An important factor for these processes was the crisis experienced by urban planning in the countries of Eastern Europe. The abandonment of central planning stimulates spontaneous development processes initiated by numerous decentralized entities (Cozzolino, 2017, 2018) and driven by market forces. The first new hotels in the large resorts were greeted with enthusiasm, but only after five or six years did disappointment take over. The extremely high rates of construction changed the popular resorts beyond recognition; the green park environment was transformed to such an extent that it became a densely built-up urban environment with lots of concrete buildings and few trees and green areas (*Илиева*, 2020). These turbulent processes have posed a threat to sustainable development in all countries in the region (Петров, 2015; Maričić & Petrić, 2008; Zeković et al, 2015; Krunić et al., 2014).

Soon after the first decade of the transition, public attitudes changed and spatial planning was re-appreciated by society. (Георгиева, 2014, 2015; Илиева, 2014; Иванов, 2018; Ковачев, 2019a, 2019b,). Legislation in urban and spatial development has begun to change (Nikolov, 2013; Nozharova & Nikolov 2018, 2019). To

ensure that their needs and preferences are met, citizens have increasingly claimed their rights to participate in urban development (Kovachev et al., 2018; Kovachev et al., 2019; Slaev et al., 2019), to defend their interests, and protect the natural and cultural heritage (Илиева, 2014; Вачева & Илиева, 2018).

Planners consider their role primarily in protecting the public interest (Moroni, 2004; Илиева, 2020). Unsurprisingly, they generally believe that private property causes deterioration of the urban environment. Urban planners, like most citizens, are convinced that the losses of open and green spaces result from the aspiration for quick and easy profit typical for private owners and market players. However, we must emphasize the significant discrepancy between the prevailing views of urban planners and economic theory. First, the attitude towards central planning in urban development turns out to be diametrically opposed to the position of economists, who unanimously acknowledge the weaknesses of central planning in the field of economics (Слаев & Илиева, 2020). Respectively, the assessments of the benefits of private property and market-led development in these two areas (economy and urban planning) are also diametrically opposed. However, as will be discussed in this paper, the results of land privatization in the resorts of Sunny Beach, Golden Sands and Albena, seem to be quite different. A reasonable question is, "Why does private property function so differently in these three resorts?" Urban planners offer an answer that seems logical at first glance, but turns out to be incomplete. The correct and complete answer to this question is fundamental to the theory and practice of planning.

More specifically, the main question of this study is "Are private property and the functioning of the market useful or are they harmful to the development of Bulgarian resorts?" And in a more general sense, "Should private or common/public property have priority in urban and spatial development?" The present study proceeds from the position that too few resources are subject to purely private, i.e., individual property, and purely public (perfectly common) property means lack of ownership. In fact, property rights that predominate in the real world are neither "purely" private, nor "purely" public, but are characterized by different levels of privateness/publicness. The thesis of the study is that, in spatial development (in general) and specifically in the development of Bulgarian resorts, each urban activity requires relevant (optimal) levels of privateness/publicness, which are determined by the balance between the benefits and drawbacks of private and common elements and aspects of property rights. The problem is that the realization of structures with relevant levels of privateness/publicness depends on the associated costs – not only financial, but also efforts needed and various other costs (transaction costs, Coase, 1937, 1960), so this realization is often too difficult, expensive and requires highly developed institutions at the upper institutional levels.

2. THEORETICAL ANALYSIS

The thesis of this paper is based on a new understanding of the nature of property rights (Slaev, 2016a). At present, simplistic perceptions and notions prevail in society and science. Property rights are understood as the relation of an individual or an entity to an object, a good or a resource. In addition, entitlements are regarded as complete, in the sense that the owner of the rights owns a good/a resource in full. Private ownership is perceived as absolute power over a resource. Ownership (private) entitlements are understood primarily as a source of benefits that enriches the owner only and causes loss to everyone else.

In fact, there is a widely accepted understanding among jurists that property rights are relations between humans, not between a human and a commodity/resource (Honoré, 1961). There is also a popular understanding that property rights are social structures – for an individual to own a resource, this must be accepted by society. Also, it is well known that no one has the right to use the resource(s) he or she owns to the detriment of another individual. Ownership is the consent to use a resource only for certain purposes and only in certain ways (Alchian and Demsetz, 1973), whose strict definition is a key element of the public consent.

Another popular misconception is the understanding that there are only two or three "simple" or "pure" types of property rights - private (individual), public (common to all) and collective (common to a group of people).

2.1. Private and common property rights

The most common taxonomies of property rights consider two or three types of rights. First, there are private and common property rights, but when entitlements are classified, also a third type is identified - collective. Collective entitlements are also defined as group, communal, or club (Buchanan, 1965; Demsetz, 1967; Alchian and Demsetz, 1973; Ostrom, 1990).

The first theories classifying property rights originated in antiquity – the theories of Plato and Aristotle. A theory in the 20th century that offers powerful, albeit indirect, support for the bipolar model of ownership is that of Samuelson (1954). Samuelson's theory does not directly treat property rights, but classifies two types of goods according to the way they are consumed - private goods that are consumed individually and public goods that cannot be consumed individually, but only collectively. By "collective" consumption, Samuelson means the possibility of consumption by all people without exception. Thus Samuelson's "Pure Theory of Public Expenditure" is the basis for differentiating between "purely" private and "purely" common property rights.

Buchanan's theory (Buchanan, 1965) considers the third type of goods/resources - those that are between "purely private" and "purely public".

2.2. Property rights and planning rights

Property rights consist of different entitlements. In his seminal article, Honoré (1961) outlines 11 types of property rights and attributes. Yet most often, three types of rights are identified: right of use, right of access and right of management. Indeed, all other rights can be considered as composed of these three entitlements. Consider, for instance, the right to receive income. People value primarily use/consumption rights, because using a resource is the main reason why people want to own it. But in order to be able to use the resource properly (in the way intended by the owner), one must be able to manage it, because if another individual manages the resource, the owner may not receive the necessary benefits from the resource. The resource manager may reduce the benefits to the owner due to malice or due to incompetence or simply misjudgment. In fact, the person who manages the resource can determine who uses it how much and how. In addition, management can be differentiated by importance - for example, strategic and operational management. Due to the important function of governance, many scholars accept that the right to the highest form of government, which is referred to as (highest level, supreme) control over the resource is at the core of ownership (Mahoney, 2012). The right of ownership also includes the obligation to provide the necessary costs for the reproduction of the resource, as well as to take full responsibility for the results of its use(Honoré, 1961; Slaev 2016b; Slaev & Daskalova, 2020).

In the case of private property, the same entity (individual or a collective structure) holds all rights and obligations, and in the case of collective property these rights and obligations are distributed among the co-owners.

The right to plan is also a component of the right to manage and control. The connection between planning and management is obvious when we assess that management consists of cycles of making and implementing plans. Urban planners and other types of planners tend to underestimate the link between property rights and planning rights. Simply put, there is no point in a plan that is not developed by the owner or by a specialist on behalf of the owner, and if finally this plan is not adopted by the owner.

2.3. Private planning, collective planning and the market

In addition to underestimating the relationship between ownership and planning, urban planners and other planning professionals also underestimate the difference between private planning and collective planning. According to Aristotle, man is a political/social animal. Every human activity in one way or another is performed together with other people using resources produced jointly by different individuals and therefore human activities must be coordinated. Coordination takes place precisely through property rights. Depending on whether the rights to the resources used in an activity are private or common/collective, the following coordination options are possible (Slaev, 2016a):

- When all property rights over all resources used in an activity are owned privately (individually) by one owner, the activity is organized through private planning.
- When the ownership of certain resources used in an activity is privately owned (individually) by different owners, the activity is coordinated in a decentralized fashion through the market mechanism.
- When the ownership of the different resources used in an activity is owned jointly by different owners, the activity is coordinated by central management/central planning.

To summarize, in a market society, resources that are owned individually/privately are managed through the market mechanism and private planning, and resources that are jointly owned by different owners are managed through central planning. All three forms of government have important roles in a market society.

2.3. Complex property rights and degree of publicness/privateness

Ownership is an institution (Veblen, 1898) - it is a system of socially accepted rules regarding the rights of individuals, groups and communities to use and manage the resources used in every human activity. By definition, an institution is a system of social rules (North, 1990). As property rights are systems of public rules, they are institutions.

However, scientists and researchers widely agree that institutions are complex social structures (North, 1990; Hodgson, 2006). Yet when we consider property rights as institutions, we encounter a significant inconsistency: despite the widely held view that property rights are institutions, property rights are seen as simple structures - private, public or collective. In fact, the perception of property rights as simple structures is based on the understanding of "purely" private and "purely" public property rights, which corresponds to Samuelson's ideas. In Buchanan's theory, property rights are complex structures of private and common/collective elements and aspects.

Ciriacy-Wantrup and Bishop (1975) prove that "purely" public property rights cannot exist because such rights are, in fact, lack of ownership. Property rights are systems of rules and could not exist if it is not defined precisely who is subject to the rules. Once there are rules, property cannot be "open to all" because the members of the system of rules must assume responsibility. In real life, property rights that belong to "everyone" cannot exist because they necessarily have negative components – i.e., obligations. For property rights to exist, it must be clearly defined which specific individuals bear responsibility. This refers to common property rights as well – they can only exist if the circle (the group) of people who hold respective obligations is strictly defined. But when the "circle of owners" is defined, all who are outside that circle are excluded, thus any for of property is private. Therefore, common property rights can only exist if they are private to a particular group or a community of people. Collective/common/group property rights are simultaneously collective for all members of the group or community, but are private to the co-owners' union. To emphasize this dual nature of collective/group ownership, this form of ownership is referred to in this article as "private-common". The two-layer structure of property rights (private at the highest level and collective at the lower level) becomes multi-layered when we consider that each member of the collective system can itself be a collective entity thus introducing a new level or levels of the institutional structure. Complex multi-layered structures are a typical characteristic of institutions (Slaev 2017, 2020).

Even public property is shared between the members of a nation, which is a community exclusive of foreigners – thus there is a private component. Public property is private-common at the level of the national legal system and the national market. It is collective for all citizens of the state and therefore cannot be traded between them, but it is private for the nation because it excludes all foreigners.

3. EMPIRICAL STUDY – THE DEVELOPMENT OF GOLDEN SANDS, SUNNY BEACH AND ALBENA

The purpose of the empirical study is to establish whether and to what extent the conclusions of the theoretical analysis drawn in the previous section apply in the practice of development of Bulgarian tourism and specifically the three resorts - Golden Sands, Sunny Beach and Albena.

The development of all three resorts began after the mid-1950s. The construction of the Golden Sands began in 1956. The first hotel built was the Oasis"". The construction of Sunny Beach began in 1958, and the first hotel in the resort, "Kalina", welcomed tourists in 1959. Albena is the last of the three resorts - its construction began in 1966. The complex was officially opened on August 24, 1969.

Of course, in the conditions of a socialist economy, all three resorts were built by the state on land owned by the state. When planning resorts, the most important consideration of planners and designers was to provide suitable conditions for sea tourism and recreation, and since the land was state-owned, considerations for the economical use of this resource were of secondary importance. Thus, the resorts were planned with abundant open and green spaces. Over the next two decades, the resorts grew at a different pace. Golden Sands resort has grown less due to the nature of the terrain, and Sunny Beach, thanks to the flat terrain, had grown substantially. The territory of Albena was expanded in 1988 (i.e. a year before the start of the change of the socio-economic system), and the resort included a forest park. Still, despite that already in the 1970s, the three

recreation complexes have been already established as the best Bulgarian resorts, their development was insufficient to satisfy the demand of international tourism - at that time Sunny Beach had 108 hotels with over 27,000 beds, Golden Sands - 70 hotels with about 15,000 beds and Albena - 33 hotels with about 14,000 beds. Or a total of 211 hotels with 56,000 beds (NSI, 2007).

After the change of the political and socio-economic system at the end of 1989 and the beginning of 1990, a rapid transformation of the form of ownership began in all sectors of the economy - in some sectors the changes were slower, but in tourism privatization began in 1991 due to its exceptional attractiveness of the sector. These processes took about a decade, still, in Albena they were the fastest. A specific form of privatization in this decade was the *workers & managers associations* (RMDs), the aim of which was to enable the employees of the former socialist enterprises have priority in privatization. The processes of privatization in a number of cases (one may say - *inevitably*) developed through illegal or semi-legal schemes in favor of shady groups and behind-the-scenes interests. In Albena, the workers & managers association (dominated by the director's team from the socialist period) was successfully organized and the RMD bought the entire resort. The last state share was bought by the RMD company in 1997.

In short, since the early 1990s, ownership in the three resorts (as well as in other resort areas in Bulgaria) has changed dramatically – privatization of the socialist-era hotels and their plots of land was carried out, as well as new private plots have been formed and developed between the existing hotels and on new terrains as the area of the resorts had been expanded. Thus, we can identify three ways of development, which define urban forms of different scales. As the scale of ownership is important for the present study, it is necessary to specify these three types by considering the plots' size.

- First, when existing hotels were privatized the scale of the plots was preserved in its established form, as hotels are privatized together with their "own" plots. Most of these plots have an area of about 0.7-2 ha.
- Second, in many places where there were free spaces between the existing hotels. In such cases new plots were formed and privatized and developed. The dimensions of these plots were similar to the existing ones or smaller (but not significantly smaller) - most of these are between 0.5 and 1.5 ha.
- Third, very soon after the start of privatization, expansion of the resort complexes onto new private territories began. The plots that were formed in these new territories are significantly smaller - most of them are from 0.2 to 0.8 ha.

In the three resorts the ratio between these three types of development and the respective types of plots is different. The differences are due to the specific (institutional) form of privatization. In Albena all hotels are now owned by Albena AD, while in Sunny Beach and Golden Sands the hotels were sold to a large number of individuals and companies. Similar differences are observed between the three resorts in terms of the formation of new plots and the construction of new hotels between those of the socialist era - these trends are clearly visible in Sunny Beach and Golden Sands, where a large number of new hotels were built between the "old" ones, but there are only three such new hotels in Albena. The greatest difference refers to the hotels and complexes built on newly developed terrains: in Albena these are only four, while in Golden Sands there are many in the peripheral areas, and in Sunny Beach this type of development has expanded to the point that today it occupies more than half the territory of the resort. In total, the three resorts currently have about 420 hotels and apartment buildings with about 125,000 beds[1].

4. DISCUSSION

4.1. Quality of the environment and the role of private and common ownership

An important finding from which the empirical study starts is that at the end of the socialist period the conditions in the three resorts were characterized by high quality of the environment, while today the environment in Golden Sands and especially in Sunny Beach has deteriorated significantly, and in Albena the quality remains still very high. To assess the importance of the form of ownership for the management of the quality of the environment, we should first note that just as under socialism the ownership in all three resorts was state, today the predominant ownership in all three cases is one and the same: it is private – the land and

[1] According to NSI data (2020) in 2019 the hotels in Albena are 35 with 16,631 beds, in Sunny Beach there are 180 hotels with 64,050 beds, and in Golden Sands - 112 hotels with 43,177 beds. According to http://gap-tours.com/ALBENA.html Albena has over 14,900 beds in 43 hotels, and according to http://www.uhsb.net/sunnybeachmap.html in Sunny Beach there are 163 hotels and 93 apartment buildings.

buildings today belong to private, i.e. non-state entities. Ownership has changed from public to private in all three resorts, but in two of the resorts the environment deteriorated, while in the third it remained the same. Thus the relationship between ownership and the control of the quality of the environment remains unclear.

Ownership is the main factor determining whether development will be driven by private planning, collective planning or the market. Ownership of all resources during socialism is state and state property is considered the basis for public (collective) planning, but, as it was emphasized, even state/public property is private-common - common to citizens, but private to the state/nation. Moreover, the state has managed state resources as a private owner – i.e. an owner who owns all resources and does not need the consent of other co-owners to make decisions about the management of its resources. Let us make the following comparison: both under socialism and today, national resources are public property and the state manages them on behalf of national citizens. But in a socialist society it was considered that all citizens had the same interests and the state was the only representative of the unified public interest of the nation. Today, the interests of citizens are diverse and often contradictory. The interests of environmentalists are radically opposed to the interests of private owners and entrepreneurs. In order for the state to plan in the public interest today, the various social groups must first agree as co-owners. When, under socialism, the state does not comply with anyone, it plans as a private owner and exercises private planning, but when in a market economy the state must comply with different groups of co-owners - this is already a form of collective planning.

Today, the form of ownership in all three resorts is private (in the sense of non-state), but with one critical difference: in Sunny Beach there are hundreds of owners of individual properties, some of whom are private, and others are different types of companies - sole traders, limited liability companies, joint stock companies and others, and in Albena the owner is one - Albena PLC. Undoubtedly, private individuals and sole traders in Sunny Beach are entities with a high degree of privateness/degree of publicness. The degree of publicness of joint stock companies is significantly higher, but the institutional structure is undoubtedly of great importance. Therefore, the relations between hotels and their clients, as well as between different hotels, hotel complexes, restaurants and providers of various other services are realized through the market mechanism, as each hotel and its plot are privately owned by an individual, a sole proprietorship or a joint stock company. Evidently, the development and use of common resources (infrastructure, beach, microclimatic conditions, water area, etc.) takes place through various forms of collective planning. Thus the development plans of Sunny Beach and Golden Sands are the result of collective planning.

It is difficult to say exactly how high or low the degree of privateness/publicness of a joint stock company and specifically of Albena PLC is, because it depends on its institutional structure. But, without a doubt, a joint stock company is an entity with a high degree of publicness at least in terms of the number of co-owners - in Albena PLC, for example, shareholders are over 40 individuals and companies, while some of the companies are collective structures themselves. But despite its collective institutional nature, Albena PLC is the sole owner of the land and all other resources in the resort. Therefore, like the state from the period of socialism, Albena PLC manages its resources through private planning.

To summarize, in Golden Sands and Sunny Beach planning is collective, because each development plan must be approved by the owners of plots, hotels and other properties, insofar as they are represented by members of the local municipal council or through other forms of democratic governance. In Albena, the type of planning is private because the joint stock company, as the sole owner of the resort, is the sole entity that accepts and implements the plans. Therefore, we cannot blame neither private nor common/collective ownership for the problems in spatial development just because of its (mostly) private or (mostly) collective nature.

4.2. The role of ownership and the importance of resource scale

As already emphasized according to the prevailing opinion in Bulgarian society and the position of professionals and experts, the quality of the environment in Sunny Beach and Golden Sands has deteriorated, while in Albena it is good. The goal of this paper is to assess the specific characteristics of deterioration and investigate whether environmental deterioration is connected to the form of ownership.

The environment in cities and resorts consists of various elements - buildings, vacant spaces, infrastructure, landscaping and more. The quality of the environment is determined by the presence of these elements and their combination. Free and green spaces are extremely important for the environment for recreation, tourism and leisure. Obviously, free and green spaces are connected. The most important difference between Sunny Beach, Golden Sands and Albena refers to these two types of spaces. This article deals mainly with green

spaces as they can be considered the most important type of vacant (undeveloped) spaces, especially in areas for recreation.

The resort environment requires significantly more green spaces than the urban one. In Albena the greenery and free spaces are abundant and that is why Albena has the character of a high class resort. In Sunny Beach the open and green spaces are significantly less and therefore the environment looks like an urban one.

Thus, the relationship between the quality of the environment and ownership seems obvious - it is determined by control over the environment. In Sunny Beach and Golden Sands, due to the presence of hundreds of private properties of a relatively small scale, the individual owner (individual, sole proprietorship or company) cannot affect the quality of the environment. In Albena, the sole owner directly determines the quality of the environment. Therefore, the problem refers to the scale of ownership. The thesis of this paper is that the nature of the activities requires an appropriate scale of land resources and this scale in turn requires an appropriate scale of ownership and an adequate degree of privateness/publicness. But as it was emphasized in the theoretical study - the optimal degree of privateness/publicness is determined by the optimal number of co-owners and, above all, by the institutional organization of public activities.

4.3. The causes of the problem: Why private property works differently

The thesis of the present study is that there is no purely private and purely public property, but there are many forms of ownership with different levels of privateness/publicness. The vast majority of forms of ownership are internally common and externally private. It is not possible to determine a form of ownership that is universally optimal and most suitable for all human activities. Ownership is an institution and which institution is most appropriate depends on the scale of the resources used for the respective activity. In urban planning, activities are most often called "functions", and for recreational functions, greenery is of paramount importance. We can distinguish three types of greenery: (i) greenery in individual properties - immediately adjacent to the buildings (in the buildings' plots), (ii) street greenery, and (iii) parks. To provide enough greenery in individual properties, they must be large enough. In order to provide sufficient street greenery, the street must be wide enough, but with the application of sustainable forms of mobility and the reduction of private transport, the requirements can be significantly reduced. Requirements for park areas (public parks and greenery) are much higher, especially in resorts. In cities, this type of greenery is usually called public greenery. Standards vary widely - for example from 10-15 m2 to 25-30 m2 per capita (in general, these standards include street greenery). As park greenery is extremely important in resorts and recreational areas, the indicators should be two or three times higher (up to 80-100 m2 per holidaymaker). The different types of greenery are related and complementary, but not fully - the shortage of one type of greenery can be compensated by a surplus of another type, but only partially. For example, the greenery in the properties can to some extent compensate for the shortage of street greenery, but in order to compensate for the park, it is necessary to provide an area for a separate park in the individual plot of a hotel complex, and for this purpose the plot must be large enough. But this solution will provide the needs only of the specific hotel complex - it does not solve the needs of greenery of other hotels and hotel complexes in the nearby area.

What does the study of Sunny Beach, Golden Sands and Albena show in this regard?

The structure of all three resorts, inherited from the period of socialism, provides an abundance of greenery. As described in the empirical study, in the development in the new conditions of private land ownership, we can distinguish three types of hotel forms according to their scale, which obviously depends on the period of construction and location of new hotels compared to existing ones:

- Existing hotels built in the 1960s and 1970s,
- Newly built hotels (after 2000) between hotels from the 1960s and 1970s and
- Newly built hotels on new terrains.

As a result of the specific processes in the three resorts, there is a different ratio between these three types of forms - as described in the second section (Empirical study). In all three resorts, the hotels of the 1960s and 1970s have been preserved in the same form, even in those few cases where the hotels were demolished and rebuilt. Of the second type (newly built hotels between the hotels from the 1960s and 1970s) in Albena there are only three, and in Golden Sands and Sunny Beach there are large numbers of such hotels. Of the third type in Golden Sands there is only in the periphery, and in Sunny Beach the newly built-up area is larger than that of the resort in the 1980s. In other words - the mechanism of development in the new conditions and especially in new terrains is such that the property is fragmented and fragmented property does not allow for large open

green spaces (large parks), which is extremely important for providing environmental quality for recreation and tourism. The conflict between the need for open green spaces and the scale of development is evident in the development of Golden Sands and especially of Sunny Beach. In Sunny Beach almost the entire newly built territory is subdivided into plots between 0.1 and 0.6 ha, and in Golden Sands, where relatively few peripheral terrains are newly built, the average area of the new plots is from 0.4 to 1.5 ha. It is clear that plots of this size cannot allow "individual" parks with sufficient territory to be developed as parks would need, e.g., from 1 to 2 ha. The other possibility for arranging public parks remains, but this means that when planning new territories, a significant share of their plots should be expropriated from all plots. If for the provision of streets and other minimal public events it is necessary for the share of expropriation to be at least 12-15% of land, for parks of sufficient size a minimum of 25-30% will be needed. Thus, the percentage of expropriation in the resort areas should reach 40-45%. This creates at least two serious obstacles. First, a change in the legal framework will be needed, as currently the maximum expropriation rate under Art. 16 of the Spatial Development Act is 25%. Second (and this is probably the most significant obstacle), even expropriation of 25% meets serious opposition by landowners. The problem is that in such cases the individual owner distrusts the collective management and has reasonable doubts as to how correctly and fairly the expropriation procedures will be applied. Will an equal part of the property be expropriated from everyone? And even if equal parts are expropriated, the expropriation of plots of the same size on the east or west side of the resort is never equivalent. Obviously, the expropriation of a share of the property, which is higher than the currently envisaged 25%, is hardly realistic.

4.4. Theoretical opportunities for development:

As can be seen, the great difficulty in creating an environment for recreational functions is the provision of sufficiently large park spaces. Large park spaces are a resource that requires huge investments to generate a beneficial effect in the recreational environment. Institutional organization is critical in this regard. If a large form of ownership has historically been established in a given territory, it would facilitate the development of a recreational environment with large parks. A single large owner, whether it is the state or a private entity easily and most importantly - without losses can implement a plan to provide large enough park areas. But the problem is difficult to solve, if land ownership is distributed to multiple owners. Let's consider three main possibilities for providing land resources for the construction of a park, when the land is distributed over multiple owners:

First option - one owner buys the ownership rights to the land of other owners. The main difficulty in this case is that an owner has to provide huge financial resources and market negotiations will need a lot of time and efforts.

Second option - the owners of land in the area merge into a joint stock company. The main difficulty is in creating a (spontaneous) organization in which each owner can participate at will – convinced of the effectiveness and fairness of such a decision.

Third possibility - applying appropriate standards and regulations for expropriation, as indicated above. This will require a significant share of expropriation of each property when applying the first regulation. The difficulties with this approach have already been described. Applying a share of expropriation in the range of 35-40% in order to provide sufficient space for the formation of parks in recreational areas is obviously extremely difficult to implement.

As can be seen, each of these three options has its difficulties, related to costs that can be estimated economically. Whether an option will be implemented depends on whether the revenue from its implementation is greater than the associated costs (Coase, 1960). The associated costs depend on the existing institutions in society. Depending on the institutional framework, some options will be more feasible (will be associated with lower costs) than the other options. If, for example, there are entrepreneurial traditions and structures in the society, as well as a well-developed land ownership market, the first option will be the most probable. In another case, if the local population has a tradition in the development of tourism and values highly the resources that provide tourist services, local owners are unlikely to want to sell their land, but will establish a joint company to develop the tourism business themselves - this means the realization of the second option. The third option would advantageous if there is a well-developed system of rules, standards and norms for spatial development management. Such a system of rules and regulations needs to be continuously improved over time, because in order to be effective, the rules must ensure a fair and effective balance between the interests of local people and market participants. Given the still short period of development of the Bulgarian system of laws and regulations after the political and economic changes in the early 1990s, it is

no wonder that this system still cannot offer such a fair and effective balance and therefore the third option so far in Bulgaria has not given positive results.

5. CONCLUSIONS

The main question of this study was whether private property and related action of the market are as detrimental to spatial development as most urban planners and other planning experts believe. Are private property and the market or public (collective) ownership and central planning the better solution for the sustainable, long-term efficient and environmentally sustainable use of resources? The answer that the article gives is a thesis developed in several consecutive points: first, to talk about (purely) private and (purely) common/public property is wrong. The different forms of ownership differ in their level of privateness/publicness, but all forms of ownership between the two extremes are internally collective/common and externally private. However, we can talk about an optimal level of privateness/publicness in a particular activity, but even in this case the optimal level of privacy depends on one critical factor - the institutional framework and the institutional structure of society, which include the legal system and administrative organization, traditions, and experience gained.

The three exemplary solutions described in the last section (Discussion) are a good illustration of the importance that Coase's theory attaches to the institutional framework of economic development and to institutions in general. The examples demonstrate how, depending on the institutional framework, the optimal solution to an economic problem can be both a high level of privateness and a high level of publicness.

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